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U. S. DEPARTMENT OF AGRICULTURE.

BUREAU OF PLANT INDUSTRY—BULLETIN NO. 275.

WILLIAM A. TAYLOR, *Chief of Bureau.*

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# APPLES AND PEACHES IN THE OZARK REGION.

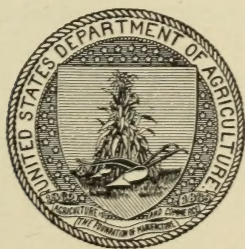
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## LETTER OF TRANSMITTAL.

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U. S. DEPARTMENT OF AGRICULTURE,  
BUREAU OF PLANT INDUSTRY,  
OFFICE OF THE CHIEF,  
*Washington, D. C., November 20, 1912.*

SIR: I have the honor to transmit herewith a manuscript entitled "Apples and Peaches in the Ozark Region" and to recommend that it be published as Bulletin No. 275 of the series of this Bureau. It was prepared by Mr. H. P. Gould, Pomologist in Charge, and Mr. W. F. Fletcher, Scientific Assistant, Fruit District Investigations, and has been submitted by Mr. A. V. Stubenrauch, Pomologist in Charge of Field Investigations, with a view to its publication.

The subject matter of this manuscript is coordinate in its general character and in the method of treatment with two bulletins previously issued, namely, Nos. 135 and 194. No. 135 relates to orchard fruits in the Piedmont and Blue Ridge regions of Virginia and the South Atlantic States. Summer apples in the Middle Atlantic States are discussed in No. 194. In the present bulletin, as in the two previous ones, the viewpoint is that of the adaptability of fruit varieties to the conditions in the region under discussion. This work constitutes a part of the fruit district investigations of this Bureau.

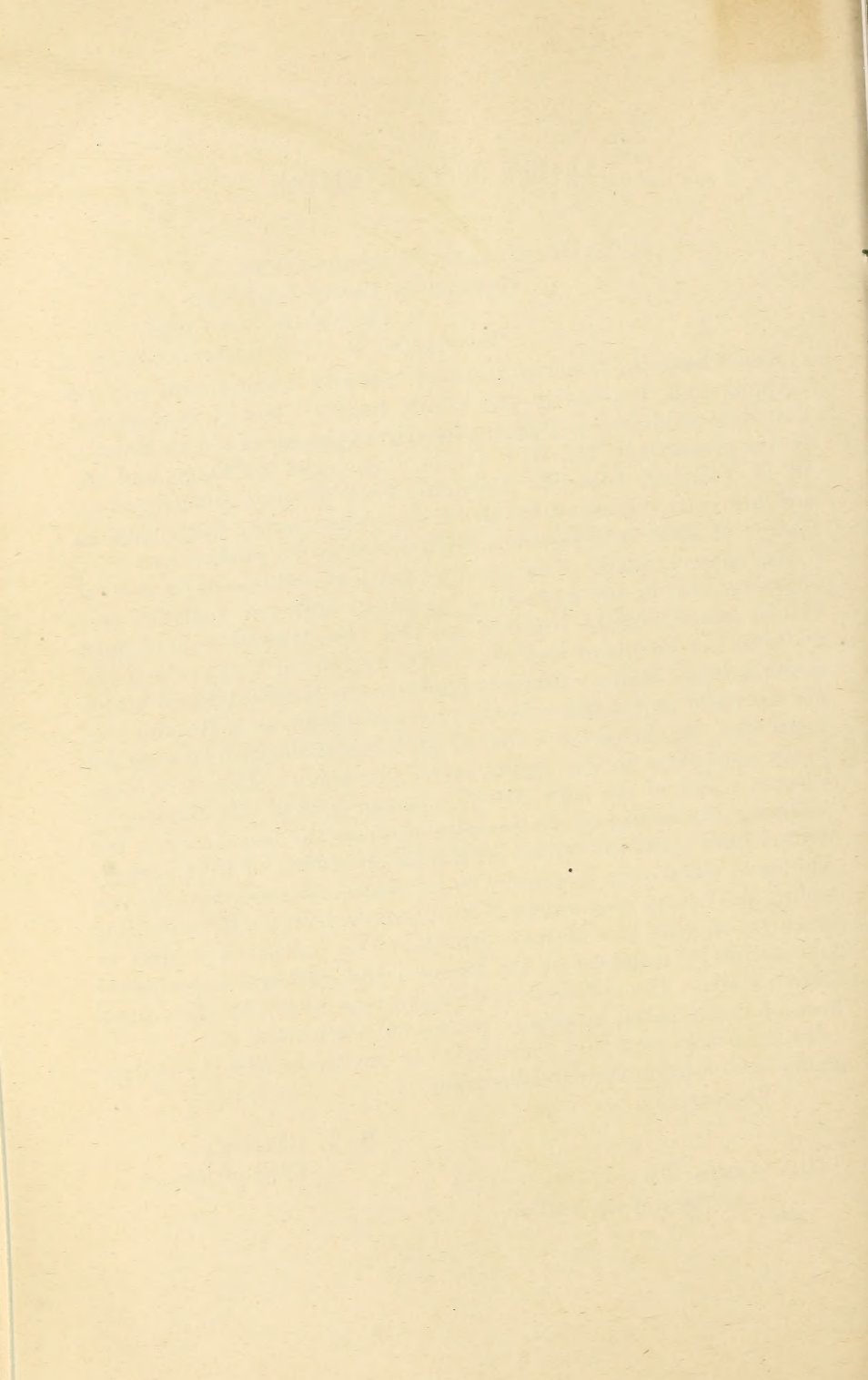
During the course of the investigations in the Ozark region the writers have come in contact with a large number of fruit growers who have aided very materially in the work. In fact, without the willing and hearty cooperation of fruit growers it would be impossible to carry on this line of investigation. The bulletin was read in manuscript by members of the Missouri and Arkansas experiment-station staffs. The criticisms and suggestions offered by them have been of much value, especially in certain particulars.

To those who have thus contributed to the end in view the writers gladly acknowledge their indebtedness.

Respectfully,

B. T. GALLOWAY,  
*Chief of Bureau.*

Hon. JAMES WILSON,  
*Secretary of Agriculture.*



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# APPLES AND PEACHES IN THE OZARK<sup>1</sup> REGION.

## INTRODUCTION.

The past two or three decades have witnessed a remarkable development and extension of the fruit industry. In fact, the growth during comparatively recent years which has resulted in its present magnitude constitutes one of the striking features of the agriculture of the United States. Much of this development has taken place along safe and conservative lines. But the extensive planting of orchards in a region whose natural advantages have been overestimated or over-exploited has been too frequent. Probably in most of these instances the development of orchards has been primarily a land-selling proposition rather than a carefully planned fruit-growing project.

In this expansion of the commercial fruit industry of the country the Ozark region has held a conspicuous place. The numerical showing of apple and peach trees within this region (Pl. I) at different census periods is shown in Table I.

TABLE I.—*Number of apple and peach<sup>2</sup> trees of bearing age in the Ozark region at different periods.*

Period.	Missouri.		Arkansas.		Oklahoma. <sup>3</sup>	
	Apple.	Peach.	Apple.	Peach.	Apple.	Peach.
Eleventh Census, 1890.....	2,501,438	1,068,583	1,600,501	1,635,965	.....	.....
Twelfth Census, 1900.....	8,503,372	2,068,494	6,391,442	2,277,627	563,096	219,762
Thirteenth Census, 1910.....	6,660,761	3,007,906	6,913,903	4,408,952	249,537	362,446

<sup>1</sup> An interesting explanation of the origin of this name is as follows: "The origin of the name 'Ozark' is given by Mr. Featherstonhaugh in his book entitled 'Excursions through the Slave States,' in 1834-35, p. 63. He says: 'It was the custom of the French Canadians to abbreviate all their names. If they were going to the Arkansas mountains they would say that they were going 'Aux Arcs,' and thus these highlands have obtained the name of Ozarks from American travelers.'"—See Shepard, E. M., "A report on Greene County," in Geological Survey of Missouri, vol. 12, pt. 1, p. 17.

<sup>2</sup> Nectarines are grouped with peaches in the census statistics, but in the Ozark region the number of nectarines is so small as to be negligible.

<sup>3</sup> It should be explained that there are no statistics for Oklahoma prior to the Twelfth Census, and that those taken from the Twelfth Census were obtained prior to the admission of Oklahoma and Indian Territories into the Union as one State. The figures for 1900 are those for the Cherokee and Choctaw Nations in the Indian Territory. Those divisions correspond fairly well to the portion of the Ozark uplift which is in Oklahoma. The figures from the Thirteenth Census apply to the counties in eastern Oklahoma which are shown on the map and which are definitely within the region under consideration. The statistics relating to Oklahoma are therefore not strictly comparable, though the sections covered are so nearly the same that the figures are of use in a relative way.

The statistics in Table I are largely self-explanatory, as they plainly show the numerical increases and decreases in the several periods to which they apply. The cause of the decrease in the number of apple trees in Missouri and Oklahoma in the decade from 1900 to 1910 will become apparent in the discussions which follow; but the figures relating to Missouri apparently do not show the full extent of the decrease, as it is commonly said that for several years following 1900 the planting of fruit trees, especially apple trees, was fully as rapid as at any previous period. The statistics for 1900, therefore, do not show the maximum number of trees of bearing age which existed in the Missouri portion of the Ozarks during the decade following the Twelfth Census.

It would perhaps be difficult to ascribe to definite influences the rapid expansion of fruit culture in this region, especially in Missouri and Arkansas, during the period from 1890 to 1900. Without doubt, however, an influence which contributed largely to the early impetus in the planting of apples was the very satisfactory prices obtained in the late eighties for the abundant crops produced on the comparatively small number of trees then in bearing. This was a period when there were relatively light crops of fruit in the older apple-producing sections of the East. Once given the impetus, the rapid growth is not difficult to explain. During the years of most rapid development the fruit-growing possibilities of the Ozark region were widely advertised, not only in this country but also abroad.

The distribution of the apple and peach trees of bearing age in the Ozark region by counties, as shown in the Thirteenth Census (1910), is indicated in Table II.

TABLE II.—*Number of apple and peach<sup>1</sup> trees of bearing age in the Ozark region, by counties, as shown by the Thirteenth Census.*

ARKANSAS.

County.	Apple.	Peach.	County.	Apple.	Peach.	County.	Apple.	Peach.
Baxter.....	41,590	46,270	Izard.....	39,280	60,751	Saline.....	33,414	56,153
Benton.....	2,465,870	536,208	Johnson.....	144,352	321,560	Scott.....	42,469	69,606
Boone.....	233,102	161,368	Logan.....	113,401	162,210	Searcy.....	90,453	83,205
Carroll.....	225,686	95,100	Madison.....	397,155	68,143	Sebastian...	93,059	419,561
Cleburne.....	37,886	45,295	Marion.....	35,299	40,923	Stone.....	63,850	39,876
Conway.....	95,673	74,833	Montgomery	25,677	45,420	Van Buren...	130,634	61,037
Crawford.....	160,726	603,683	Newton.....	83,095	54,906	Washington..	1,793,645	245,187
Faulkner.....	30,958	67,373	Perry.....	8,238	20,843	Yell.....	29,018	145,069
Franklin.....	73,793	168,053	Pike.....	36,887	179,126			
Fulton.....	53,813	138,145	Polk.....	143,554	138,034	Total..	6,913,903	4,408,952
Garland.....	27,725	41,580	Pope.....	113,157	122,524			
Hot Spring..	25,114	52,664	Pulaski.....	25,330	44,243			

<sup>1</sup> See footnote (2) to Table I.

TABLE II.—*Number of apple and peach trees of bearing age in the Ozark region, by counties, as shown by the Thirteenth Census—Continued.*

## MISSOURI.

County.	Apple.	Peach.	County.	Apple.	Peach.	County.	Apple.	Peach.
Barry.....	410,896	191,345	Jasper.....	123,311	28,122	Reynolds...	41,509	22,299
Barton.....	157,337	27,796	Laclede....	258,978	57,661	St. Clair....	86,428	37,860
Benton.....	41,902	42,508	Lawrence..	234,232	68,036	St. Francois.	50,569	30,132
Camden.....	87,260	35,421	McDonald..	243,620	97,464	Shannon....	73,566	42,425
Cedar.....	121,961	45,840	Madison....	35,188	30,634	Stone.....	75,758	72,119
Crawford....	270,309	31,046	Maries....	91,958	35,298	Taney.....	26,044	80,668
Dallas.....	140,265	31,093	Miller.....	82,002	47,292	Texas.....	291,375	125,691
Dent.....	240,119	38,254	Morgan....	56,899	24,445	Vernon.....	200,936	48,418
Douglas....	132,386	81,978	Newton....	289,159	72,907	Washington.	47,624	41,771
Franklin....	116,975	66,112	Oregon.....	92,138	463,609	Webster....	624,638	78,031
Greene.....	501,213	125,960	Ozark.....	26,097	53,095	Wright.....	351,922	120,135
Hickory....	69,007	31,478	Phelps....	153,902	38,530			
Howell.....	474,560	424,269	Polk.....	194,043	54,464	Total..	6,660,761	3,007,906
Iron.....	22,577	20,343	Pulaski....	121,898	43,357			

## OKLAHOMA.

Adair.....	39,311	21,645	Hughes....	16,897	17,381	Pontotoc....	14,966	41,201
Cherokee....	30,643	10,194	Latimer....	732	2,829	Pushmataha.	2,240	8,161
Coal.....	4,058	12,121	Le Flore...	9,776	41,677	Sequoyah...	13,610	49,770
Delaware....	63,636	18,754	McCurtain.	2,280	8,248			
Garvin.....	11,512	35,624	Murray....	5,990	24,005	Total..	249,537	362,446
Haskell....	9,692	24,772	Pittsburgh.	24,194	46,064			

On account of the importance of the fruit industry in the Ozark region and the transition period through which it was passing, the Bureau of Plant Industry of the Department of Agriculture began in 1903 a study the object of which was to determine as far as possible (1) the exact behavior of the different fruit varieties, especially of the apple and peach, in different parts of the region, (2) the conditions under which they attain their highest degree or a satisfactory degree of perfection, and (3) the suitability of each variety for the purpose intended. The final object is to aid in the introduction of sorts which may prove more profitable and satisfactory than those now being grown.

In 1903 a brief period was spent in getting in touch with the growers and locating some of the more important orchards, thus facilitating subsequent investigations. From 1904 to 1908, inclusive, a considerable portion of each season, from July to September, was given to this work. Subsequent observations have also been made in certain sections.

This bulletin is devoted principally to a discussion of the results of these investigations. In order that a description of the behavior of a variety may have real significance it must be interpreted in terms of the conditions under which the variety is grown. Accordingly, there follows a somewhat comprehensive description of the region studied and an account of the conditions existing therein which have an important bearing on its fruit industry.

A "transition period," through which the fruit industry of the Ozark region was passing, has been mentioned. This applies especially to the matter of varieties. Most regions in which large apple interests have been developed in the past have gone through such a period. It is a natural consequence of the status of our knowledge, or rather lack of knowledge, of the adaptability of varieties and their relative value when grown in different regions or under different conditions.

While a large portion of the apple and peach trees in the Ozark region consists of comparatively few varieties, it is also true that a great number of varieties, especially of apples, are grown in commercial quantities. The experience gained during past years shows that if the plantings were now to be renewed a large percentage of these varieties would probably be eliminated, and of the small number comprising the more important sorts the proportion of trees of the different varieties would be changed in many orchards. Certain varieties of little value in some sections of the Ozarks could almost surely be planted in other parts of the region with satisfaction. Still other sorts now but little known or entirely unknown to the orchardists there could probably be substituted with profit for some that are more or less commonly planted.

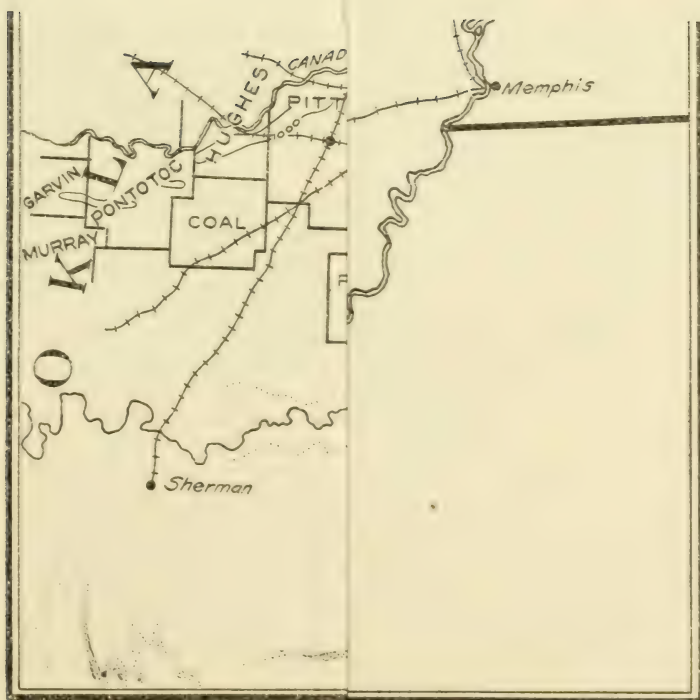
The greater the extent to which information regarding the adaptability of varieties can be made available for the guidance of fruit growers the more will it become possible to eliminate this "transition period" with regard to varieties for planting in the extension of fruit growing into new regions.

## DESCRIPTION OF THE OZARK REGION.

### LOCATION AND TOPOGRAPHY.

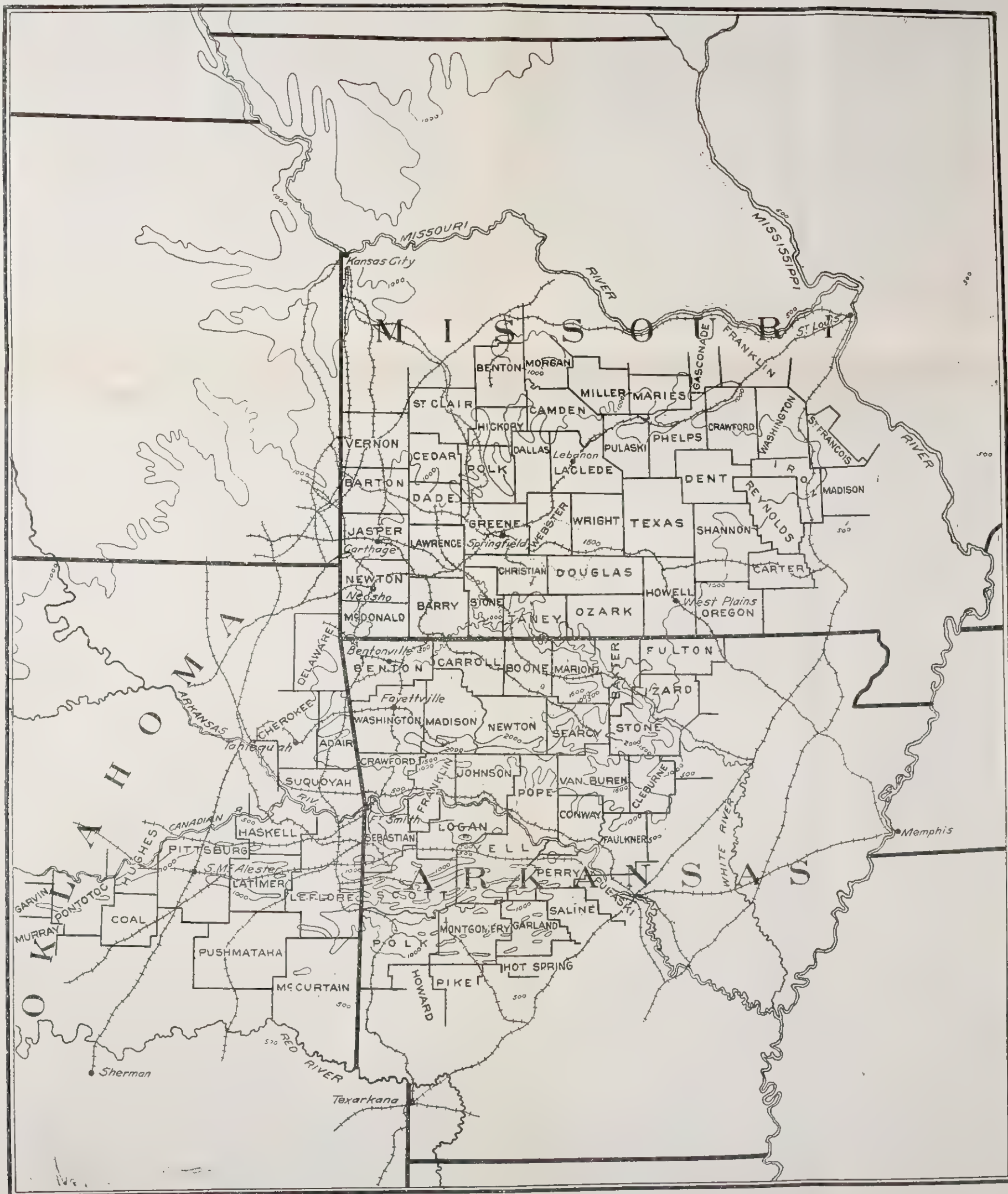
The accompanying map (Pl. I) shows the counties in Missouri, Arkansas, and Oklahoma which comprise the portion of the Ozark region to which the following discussion of apple and peach varieties is intended to apply. The region includes a large part of the southern half of Missouri, northwestern Arkansas (about one-third of the entire area of the State), and a relatively small section of eastern Oklahoma. The area does not include the entire Ozark uplift, though the portion of this formation which lies outside of its limits is relatively small.

The elevation above sea level of much of the country surrounding the Ozark uplift is from 500 to 800 feet, and the surface is gently rolling. A large portion of the Ozark region has an altitude of 1,200 to 1,500 feet, and some sections of it are distinctly mountainous. The culminating altitudes of the entire region are in the range of Ouachita Mountains south of the Arkansas River, in which the sum-



The counties in Missouri, Arkansas, and also the location of a number of the





SKETCH MAP OF THE OZARK REGION.

The counties in Missouri, Arkansas, and Oklahoma which comprise the principal portion of the Ozark uplift are indicated. The 500-foot contour lines are given, also the location of a number of the more important towns.



mit of Magazine Mountain reaches an elevation of 2,889 feet—the highest point between the Appalachian and the Rocky Mountains.

As elevation is one of the chief factors to be considered in investigating the behavior or adaptability of fruit varieties, it has been necessary for the purposes of the present consideration to adopt more or less arbitrarily some line based on elevation as the boundary of the Ozark uplift. A contour line encompassing the territory which has an elevation exceeding 900 feet serves the end in view. The counties lying wholly or partly within this boundary and belonging to the region under consideration are named on the accompanying map (Pl. I). Several counties bordering on the Missouri River and lying partly within this boundary are not shown on the map, for the reason that the principal orchard interests in them are located in sections that are distinctly outside the Ozark formation. Some of the included areas have relatively low elevations, particularly along the rivers and larger streams.

The contour lines which appear on the map will materially assist the reader in obtaining a general idea of the topography of the region and the elevation of different sections of it, both actual (above sea level) and relative (in comparison with the surrounding country). The interval between the contour lines represents a difference of 500 feet in elevation.

An excellent account of the Ozark region, in which the conspicuous topographic features which are of importance in the present connection are very clearly described, appears in the Annual Report of the Missouri Geological Survey for 1894, from which the following paragraphs are quoted:<sup>1</sup>

*Surface relief.*—While there is simplicity and similarity in general make-up of the different portions of the Ozark uplift, the fundamental structural and topographical effects presented in the several parts are sufficiently distinct to enable several well-defined districts to be made out. This fact has been recognized both by the inhabitants and by those who have visited the region, and in consequence various names have been given to the different sections. The most prominent titles among those which deserve mention are Shawnee Hills, located in the extreme east, chiefly in Illinois; St. Francois Mountains, in eastern Missouri; the Ozark Mountains proper, the Boston Mountains, and the Ouachita system in the Southwest. These various "mountain" systems, which define geographically the subdivisions of the uplift, are characterized by certain peculiarities, of which none are more striking than the various phases of topography. The extremities of the disturbed region are similar, and consist of a series of ridges which in a general way are parallel to one another. The middle is a typical high plateau, whose margins are deeply trenched by swift-running streams.

*Shawnee Hills.*—Before it merges into the Mississippian Plain, the Ozark Plateau is broken up toward the eastward into a number of rather well-pronounced ridges. These

<sup>1</sup> Keyes, C. R. Characteristics of the Ozark Mountains. Annual Report, Missouri Geological Survey, vol. 8, 1894, pp. 320-352.

ridges are cut across by the Mississippi River at various points between St. Louis and Cape Girardeau. \* \* \*

*St. Francois Mountains.*—Southeastern Missouri has long been known as a highland district, but the title, St. Francois Mountains, is of very recent application. The term is one which has been needed to designate the eastern part of the Ozark uplift in Missouri. It is a name which is peculiarly fitting, owing to its long association with the principal river and a county in the region.

The most striking peculiarity of the St. Francois group as distinguishing it from other parts of the general uplift is the absence of any systematic arrangement of the surface features as the result of orogenic movements, and as is usually discernible in mountainous districts. Isolated peaks, large and small, constitute the prevailing type of topographic expression, and these rise one behind another with no regularity, often clustered here and there into groups of two or three, sometimes several in a row, forming a short irregular ridge. The hills or peaks rise 500 to 800 feet above the valleys which separate them, and have an elevation above tide level of 1,200 to 1,800 feet.

\* \* \*

*Ozark Plateau.*—The region with which the word Ozark has been most widely associated comprises southern Missouri and northwestern Arkansas. The term has also been applied to the extreme eastern part of the uplift, and even to the western extremity of the Ouachita system. The Ozark Mountain region proper includes (1) a broad plateau which rises to a height of over 1,500 feet above the tide level, and (2) a broad marginal zone so deeply trenched by watercourses as to make the term mountainous very applicable. In all its features, the district presents a marked contrast to the other portions of the uplift. In the plateau, the streams take their rise and flow in opposite directions down the general slopes in ever-deepening trenches. \* \* \*

*Boston Mountains.*—This name has been used to designate a range of steep-sided elevations which form the watershed in western and central Arkansas, between the White and Arkansas Rivers. They extend nearly parallel to the latter stream halfway across the State. The crest is from 1,000 feet above sea level in the eastern part to more than twice this height in the central and western portions, or from 600 to 800 feet above the waters which wash their bases. \* \* \*

*Ouachita Mountains.*—South of the Arkansas River is a series of mountain ranges trending west from Little Rock into the Indian Territory [Oklahoma]. To the most southerly ranges Branner has given the name Ouachita Mountains; but more recently Griswold has extended the meaning so as to cover the entire number of ranges. The system consists of numerous anticlinal ridges which lie nearly parallel to one another. They rise from 500 to 1,000 feet above the valleys on either side, and from 1,600 to 2,100 feet above the sea level. \* \* \*

The marked structural differences existing in the elevated area south of the Arkansas River, as compared with that north of the stream, have given rise to the suggestion that the two districts are distinct units of deformation, and that the long slope of the broad river valley forms the southern slant of the Ozark dome.

The elevation of specific points is given in Table III. The place names are arranged, in general, from east to west and from north to south.

TABLE III.—*Altitudes of representative points in the Ozark region.*

State and county.	Locality.	Authority. <sup>1</sup>	Elevation. Feet.
<b>Missouri:</b>			
St. Francois	Bismarck	Missouri Pacific R. R.	1,025
Wayne	Piedmont	do.	504
Crawford	Cuba	St. Louis & San Francisco R. R.	1,014
Dent	Salem	do.	1,178
Laclede	Lebanon	do.	1,268
Oregon	Thayer	do.	534
Do.	Koshkonong	do.	967
Howell	West Plains	do.	957
Do.	Olden	do.	1,237
Do.	Willow Springs	do.	1,247
Texas	Sargent	do.	1,328
Do.	Cabool	do.	1,252
Wright	Mountain Grove	do.	1,472
Do.	Mansfield	do.	1,488
Do.	Cedar Gap	do.	1,683
Webster	Seymour	do.	1,650
Do.	Fordland	do.	1,601
Greene	Springfield	do.	1,260
Morgan	Versailles	Missouri Pacific R. R.	1,020
Polk	Bolivar	St. Louis & San Francisco R. R.	1,066
Barton	Lamar	U. S. Coast and Geodetic Survey.	964
Jasper	Carthage	St. Louis & San Francisco R. R.	939
Lawrence	Aurora	do.	1,366
Newton	Neosho	do.	1,023
<b>Arkansas:</b>			
Baxter	Mountain Home	U. S. Geological Survey (topographic sheet).	800
Do.	Cotter	do.	500
Marion	Yellville	do.	600
Boone	Harrison	do.	1,052
Carroll	Berryville	do.	1,254
Benton	Rogers	U. S. Coast and Geodetic Survey.	1,383
Do.	Bentonville	U. S. Geological Survey	1,303
Do.	Gravette	do.	1,226
Do.	Gentry	Kansas City Southern Ry.	1,238
Searcy	Marshall	U. S. Geological Survey (topographic sheet).	1,050
Washington	Springdale	U. S. Coast and Geodetic Survey.	1,325
Do.	Fayetteville	do.	1,334
Do.	Prairie Grove	U. S. Geological Survey	1,168
Do.	Lincoln	St. Louis & San Francisco R. R.	1,458
Do.	Winslow	U. S. Coast and Geodetic Survey.	1,727
Pope	Russellville	do.	350
Johnson	Clarksville	do.	370
Crawford	Rudy	do.	495
Do.	Van Buren	do.	441
Yell	Danville	Choctaw, Oklahoma & Gulf R. R.	361
Logan	Booneville	do.	517
Sebastian	Hackett	St. Louis & San Francisco R. R.	536
Scott	Waldron	U. S. Geological Survey (topographic sheet).	700
Garland	Hot Springs (entrance, U. S. reservation).	U. S. Geological Survey	607
Do.	Hot Springs (inlet pipe, city reservoir).	do.	869
Montgomery	Mount Ida	U. S. Geological Survey (topographic sheet).	700
Polk	Grannis	Kansas City Southern Ry.	922
<b>Oklahoma:</b>			
Adair	Westville	do.	1,135
Cherokee	Tahlequah	St. Louis & San Francisco R. R.	861
Sequoyah	Salisaw	U. S. Geological Survey	532
Le Flore	Poteau	do.	486
Pushmataha	Tuskahoma	do.	571
Pontotoc	Ada	St. Louis & San Francisco R. R.	980

<sup>1</sup> Data, except as noted, taken from Gannett, Henry. A dictionary of altitudes in the United States. Bulletin 160, U. S. Geological Survey, 4th ed., 1906.

Some of the points named in Arkansas and Oklahoma having relatively low altitudes represent distinctly valley conditions, and most points where a low altitude is indicated are only short distances from considerably higher elevations. For example, Danville, Ark., with an altitude of only 361 feet, is within 2 or 3 miles of an area having an elevation of nearly 1,200 feet. Hackett, Ark., which has an altitude of 536 feet, is within about 10 miles of one of the highest sections in the entire Ozark region.

#### SOIL.

As soil surveys of representative areas of the Ozark region between the Missouri and Arkansas Rivers have been made by the Bureau of Soils of the Department of Agriculture and the various types of soil have been described and mapped, the reader who is interested in an extended discussion of this subject should consult the publications in which these descriptions appear.<sup>1</sup>

A considerable number of different types of soil are recognized in these soil surveys, but only two, the "Clarksville stony loam" and the "Clarksville silt loam," are of special importance in the present connection. These two types include a large proportion of the area between the rivers mentioned, and most of the orchards and other fruit plantations in these sections are growing on these soils.

The following brief accounts of these types of soil are composite descriptions condensed from the reports of the Bureau of Soils already cited:

*Clarksville stony loam.*—The surface soil of the Clarksville stony loam consists of gray silt or silt loam from 6 to 15 inches deep. This is underlaid by a heavier silt loam of a lighter gray, yellowish gray, or reddish yellow color, which sometimes extends to a depth of 3 feet, but more often at depths ranging from 12 to 30 inches it grades into a silty clay loam or silty clay. This lower subsoil is usually characterized by a deeper color of either red or yellow, the red being considered the more productive. In some places the subsoil grades into a distinct red clay frequently highly charged with iron.

The surface is generally loose, friable, and mellow, the stones in large measure preventing it from packing as readily as the Clarksville silt loam does under some conditions. The rock content, consisting largely of chert fragments, varies from 10 to 70 per cent. Occasionally, in small spots, the surface is entirely covered with chert fragments. This occurs especially on slopes where the fine particles of soil have been washed away, leaving only the rock fragments visible.

Clarksville stony loam has been derived largely from cherty limestones, the most resistant parts of which in the form of chert or flint still constitute a predominant feature of this soil type. Occasionally sandstones and certain other rocks are found, but they have existed in quantities relatively too small to produce any very marked effect upon the physical characteristics of the soil, except possibly in very small areas. This type of soil occupies a larger area than any other one in this region.

*Clarksville silt loam.*—The surface of the Clarksville silt loam consists of a loam from 7 to 14 inches deep. Its color may be a light or dark gray, or pale yellow with varia-

<sup>1</sup> Field Operations, Bureau of Soils, U. S. Dept. of Agriculture, 1902, Soil survey of Howell County, Missouri, with map, pp. 593-609; same, 1904, Soil survey of Webster County, Missouri, with map, pp. 845-858; same, 1905, Soil survey of Crawford County, Missouri, with map, pp. 865-878; same, 1906, Soil survey of the Fayetteville area, Arkansas, with map, pp. 587-627.

tions in some places of a brown shade. Below the surface of the soil to a depth frequently of 3 feet the material is a heavy, compact, silty loam or silty clay having a reddish or brownish color, sometimes mottled with gray.

As a rule there is a marked deficiency in organic matter throughout this soil type. Even in the woodlands the proportion of humus is very small, and this disappears rapidly with a few years of cultivation. Unlike most soils which are similar in texture to it and which are low in organic matter, the Clarksville silt loam does not become compact and hard, but remains loose and friable even under very unfavorable conditions. It has an excellent water-holding capacity and responds readily to applications of manure and to the rotation of crops with clover. On account of mismanagement it is very low in productiveness in many instances, but it is easily brought into a high state of productivity which may be readily and economically maintained.

The surface is quite free from stones except in patches. In places where it is apparent that this soil and the Clarksville stony loam are derived from much the same formations, this freedom from stone appears to be the chief difference between these two types. But this in itself gives rise to other differences of importance. The rock fragments of the Clarksville stony loam render its soil and subsoil more open, and consequently less able to withstand drought, while on the other hand the Clarksville silt loam is more subject to the effect of prolonged wet weather.

The Clarksville silt loam is second in importance, Clarksville stony loam being first, in comparison with the other types in this region, in the extent of the area which they occupy.

Occasionally there occurs in restricted areas a type of soil known locally as "prairie soil" on which orchards have been planted.

The surface of the "prairie soil" is composed of a dark colored, in some cases nearly black, loam, while the subsoil is usually similar to that of one or the other of the types described above. This type of soil occupies level tracts where little or no erosion has occurred and as a rule is not as well drained as are the others mentioned.

On account of the differences in the geological formation of the portion of this region which lies south of the Arkansas River in the Ouachita Mountain section in comparison with the section which lies between the Arkansas and Missouri Rivers, there are corresponding soil differences which should be noted.

The fragments of chert and flint rock which form such a conspicuous feature in the Clarksville stony loam are mostly absent in the arable land in the Ouachita Mountain section. Sandstones are abundant here and in many places have decidedly influenced the character of the soil, giving rise to sandy and sandy-loam types. Clay and clay loams, frequently highly impregnated with iron oxid and producing the characteristic red color due to the presence of that substance, also occur as prominent types.

That the principal soil types in the Ozark region which have commonly been devoted to apple and peach orchards are well adapted to the growing of the trees is very apparent. One of the most striking pomological features of the region is the large size of the trees for their age, in the young orchards at least until they are 10 to 15 years old, in comparison with trees of the same age in many other fruit-

growing regions, especially in the Eastern States. This unusual tree growth can not be attributed, however, to any unusual fertility of the soil, as the general farm crops grown in the region do not indicate that it is more fertile than good farming land in many other regions. It is probable that the character of the subsoil contributes very largely to the rapid growth of the trees. As a rule, in most of the types the subsoil is relatively loose and porous and generally it has considerable depth. These conditions are favorable to the development of good root systems, and it is perhaps of even greater importance that the subsoil is of such a character that it provides an exceptionally good reservoir for the storage of soil moisture.

### CLIMATE.

#### CLIMATIC CONDITIONS A LIMITING FACTOR IN FRUIT GROWING.

In any comprehensive investigation of a given region with regard to its possibilities for fruit growing and in the consideration of all questions connected therewith relating to varieties, the climatic conditions of the region call for the most critical attention. While it may not be entirely correct to say that climate is more often the "limiting factor" in fruit production than anything else, yet it is hardly possible to overestimate the importance of climatic conditions in their relation to fruit culture.

The more important climatic factors limiting profitable fruit production may be stated as follows:

*The temperature factor.*—(1) Excessively low during the dormant period, causing injury to fruit trees or buds; (2) excessively high during the dormant period, causing buds to swell and become tender, making them susceptible to injury later even by seasonable temperatures; (3) excessively low during the blossoming period, resulting in destructive frosts, or sometimes in preventing the pollen from germinating, thus making it impossible for the fruit to set; (4) destructive freezes subsequent to the setting of the fruit; (5) probably in some instances excessively high temperatures during the blossoming period, causing interference with the proper setting of the fruit.

*The moisture factor.*—(1) Excessive rains during the blossoming period, which may wash away the pollen; (2) rains or continuously damp, cloudy weather, which prevent the pollen grains from being properly freed for dissemination; (3) rains that prevent the activity of insects, which bring about the cross-pollination which is necessary with some fruits; (4) excessive droughts, which injure trees or buds; (5) occasional precipitation in such excess as to affect the healthfulness of the trees.

*The wind factor.*—(1) So strong and continuous during the blossoming period as to prevent the activity of insects upon which pollinization often depends; (2) causing damage to trees or fruit at some period during growth; (3) in its relation to the evaporation of moisture and the serious results which may follow, especially during protracted droughts.

The relative amounts of sunshine and cloudiness and the intensity of the sunshine are also potent factors in their influence upon the behavior of varieties.

This summary admits of extended amplification, but enough has been stated to indicate the complicated nature of the climatic factor in fruit growing. Attention, however, should be directed to the fact that the effect of any one climatic factor may be very greatly modified by other factors that operate simultaneously with it. This fact may be variously illustrated, e. g., the modification of temperature by the wind; the intensified effect of a drought when accompanied by high temperature and a strong wind; the modification of the effect of frost on tender vegetation when followed by a heavy fog, dense clouds, or other conditions which induce a very gradual thawing of the frosted parts.

In sections where the topography is as varied and the ranges in latitude and elevation are as great as they are in the Ozark region, it is obvious that there must be a correspondingly wide range in the climatic conditions. Moreover, a study of climatological data relating to the Ozark region makes it apparent that the storms which reach this portion of the United States vary considerably in their severity in different sections. It is therefore difficult to so analyze the climatic factor in the Ozark region as to adequately and fairly show its full relation to the fruit interests. In general, however, it may be stated that in seasons when the fruit crop is not limited by some climatic factor or factors the varieties that are well adapted to the region may be expected to develop to a very high degree of perfection in size, color, and finish.

While it is true that climatic conditions unfavorable to the production of apples and peaches have occurred rather frequently in some parts of the Ozark region during the past 10 or 12 years, it is also true that the fruit interests in many other sections of the Mississippi, the Missouri, and the Arkansas Valleys, as well as in other regions of the country, have likewise suffered more or less from adverse climatic conditions during the same period.

The decade from 1900 to 1910 represents an important period in the fruit interests of the Ozark region, on account of the great number of trees which came into bearing or which attained an age approaching their full bearing capacity during those years.

The adverse climatic conditions have been largely temperature factors, comprising unseasonably warm periods during the winter, in which the fruit buds have started sufficiently to make them tender, and in this condition they have been injured by subsequent temperatures that were relatively, though frequently not unseasonably, low; frosts that occurred during the blossoming period; and freezes subsequent to the setting of the fruit.

In the earlier days, before fruit growing became a leading industry, an unseasonable frost or freeze might occur and pass almost unnoticed,

although it has been repeatedly stated that the temperature conditions which have damaged the fruit crops in the past 10 years were almost without precedent in earlier years.

The effect of unfavorable temperature conditions upon a fruit crop is often measured by the condition of the orchard. Not infrequently an orchard which has received good care, is thrifty and vigorous, and has fruit buds well developed will pass through a period of adverse temperature conditions with comparatively little injury, when a neglected, depleted orchard will suffer severely. As a result of the experience of some of the apple growers in northwest Arkansas who have given their orchards relatively good care they feel that while adverse temperature conditions may interfere with their success in some seasons they do not prevent the growing of apples with a fair degree of profit.

The "moisture factor," which in some regions is a serious feature, requires no extended discussion in the present case. The annual precipitation averages from 40 to 45 inches. It is usually fairly well distributed, though occasional droughts and periods of excessive rainfall occur; but in these respects conditions are probably as favorable for fruit growing as they are in most other humid regions with which this region may be compared.

In the Ozark region the "wind factor" calls for no particular attention, as it is not generally subject to winds that are serious to the fruit interests.

#### DATA OF THE MISSOURI PORTION OF THE REGION.

Mr. George Reeder, section director of the United States Weather Bureau, stationed at Columbia, Mo., has contributed a valuable digest of some of the climatological data from several points in Missouri, from which the following quotation is made:<sup>1</sup>

Notwithstanding the supposition that orchards may be more liable to injury from late spring frost at the present time because in many cases almost the entire orchard blossoms at the same time, or to the improved strain of fruit now grown (the latter statement is in much doubt, many authorities claiming that improved fruit is not more sensitive to cold than the varieties grown 30 years ago), the fact remains that the springs of the last 10 years, and particularly the last 5 years averaged colder than those of the preceding 10 or 15 years, and this statement is well supported by climatological data, \* \* \* in apparent substantiation of the popular idea that "our climate has changed." I would, however, earnestly caution the reader not to be too hasty in the conclusion \* \* \* that the climate of Missouri is undergoing a permanent change. Meteorologists of the world generally agree, and the world's climatological records show, that climate is practically unchangeable; that is to say, permanent climatic changes are noticeable, probably, only in geological units of time. On the other hand, the records also indicate that while weather may change from

<sup>1</sup> Reeder, George. "Are the springs colder now?" *Monthly Weather Review*, vol. 38, No. 12, December, 1910, p. 1834. See also "Late spring frosts in relation to the fruit crop of Missouri," in the Fourth Annual Report (fifty-third meeting) of the State Board of Horticulture of Missouri, 1911, pp. 119-131.

day to day or from hour to hour, there are certain changes that move in cycles or oscillations, having uncertain units of time. The cause of these cycles or oscillations is not definitely known, but it has been pointed out by one or two authorities that the wet and cool periods and the dry and warm periods on the earth appear to correspond somewhat with the periods of maximum and minimum sun spots, which in turn are thought to be due to changes in the sun's photosphere. A few students of the subject claim that these weather changes go in cycles of 3 years, then a longer one of about 9 or 11 years, and still a greater cycle of 30 to 35 years, the last being more clearly pronounced; but no general agreement has yet been reached regarding them.

Studies of the mean daily, mean monthly, and mean annual temperatures, while important in themselves, give us a nearly unchangeable factor, and one not particularly interesting or striking in its features. For instance, the variations in the mean annual temperature of Missouri, covering a period of 25 years or more, rarely exceed  $3^{\circ}$ , and are often less than  $1^{\circ}$ . It matters not what the extremes may have been during the four seasons, or 12 months. at the close of each 365 days the final value is practically the same year after year. Another example in which the mean temperature gives but little satisfaction as to the variations in the weather that have taken place during a certain period is that for April, 1910, which, for the State of Missouri, differed from its 20-year normal by only  $0.3^{\circ}$ . Yet the frosts of that month were the most destructive from the viewpoint of the agriculturist and horticulturist, and the weather generally was the most disagreeable from the physiological side that has occurred during, possibly, the past 30 years.

The factor that is the most important, in my opinion, is the daily minimum temperature, which is as a rule nothing more than the lowest night temperature. The night temperatures explain the interesting cause why the crops do not grow and why the season is delayed. The days may be warm and bright, but vegetation as a rule will not flourish as long as the nights continue abnormally cold.

To the above statements regarding the importance of the daily minimum temperature in its relation to plant growth it might also be added that the duration of the minimum temperature, if it is sufficiently low to injure vegetation, is a most important factor. If a critical temperature continues for only a very short time, as sometimes happens, little or no damage may occur, while a longer period of duration may produce disastrous results.

Mr. Reeder further states:

It appears from climatological data \* \* \* that the springs of the past 10 years experienced quite marked temperature departures from the normal. The most interesting as well as the most important question to be answered is, How long will the cold period last? Unfortunately our climatological data do not cover a sufficient length of time to enable us to work out the number of years to each cycle. While the records show periods of both mild and cold springs for the 30 years, the change during the last 20 years from mild springs to unusually cold springs is not only of marked interest to the climatologist but bears rather more serious import to the orchardists, whose earnings have been affected, and who are of course interested in the question of whether mild springs will ever come again.

As we are unable to answer this question positively, and as it is rather more pleasant to be optimistic than pessimistic, we will look to the future springs from the brighter side. It is quite evident that freezing temperatures in May are abnormal for Missouri, especially most of that part south of latitude  $39^{\circ} 40' N$ . The frost isochronals of the last four years, while unusually late, rather indicate a return to more normal

conditions. While it is possible, of course, the next 10 years may furnish several Mays in which freezing temperatures will occur, the probabilities are that the tendency will be more and more toward the conditions that prevailed from 1894 to 1902, inclusive, which from the record appear to have been highly favorable to the fruit man. Possibly by the close of the decade ending with 1930 the average date of the last killing frost in spring will have receded to where it was, as claimed by the "old-timers," in the eighties—along about April 12.

Doubtless at that period the youth of to-day, then a man of middle age, will be declaiming to all who will listen that "our climate has changed; the springs were colder when I was a boy." "Why," he will continue, "the springs were so cold we had to use mechanical heaters in the orchards during those days to get any fruit at all." And to prove what he says he will point to the old heaters rusting away in the barn.

And thus the pendulum may swing the other way, and again later on swing back to where we are to-day, continuing to swing back and forth for stated periods for centuries to come. Such are the so-called cycles or oscillations of the weather.

In connection with the article by Reeder, data from several representative points relating to spring frosts in Missouri are presented which show that at those points the average date of the last killing frost in the spring during the years 1901 to 1910 was 11 days later than it was during the 10 years preceding 1901.

#### DATA OF THE ARKANSAS PORTION OF THE REGION.

An examination of climatological data from northwestern Arkansas during the period 1901 to 1910 shows an advance in the average date of last killing spring frost at some points but not all. For instance, the corresponding average date at Fort Smith for the years 1901 to 1908 was eight days earlier than for the period 1891 to 1900. The difference in variation between frost dates at Fort Smith and points farther north may be due to the influence of the Boston Mountains in protecting the portion of the Ozarks south of them from the effects of the cold transcontinental storms which occurred during those years in their transit from west to east. Moreover, many of the orchards in northwestern Arkansas have relatively high locations, with better atmospheric drainage than those where the elevation is the same or nearly the same as the surrounding country.

#### TRANSPORTATION FACILITIES.

The practicability of growing fruit in a given section is frequently determined by the character and extent of the transportation facilities that are afforded.

In relation to the Ozark region it may be stated that the development of the fruit interests has been largely coincident with the building of railroads, so that in the sections in which commercial orchards exist the railroad facilities are reasonably adequate to the needs so far as the fruit interests are concerned. A large proportion

of the orchards are within a radius of not over 5 miles from some shipping point. There are very few commercial orchards which are not within 10 miles of a railroad station, but large areas in this region are doubtless as well adapted to fruit growing as the sections which have been developed, except that at the present time they are practically inaccessible on account of their distance from railroad facilities. A number of new railroad lines and branches have been constructed within the past few years, thus bringing within the range of possible development for fruit-growing purposes large areas which were previously too remote from railroads to permit of this.

Many of the town and county roads over which it is necessary to haul the fruit, in order to reach a railroad point, leave very much to be desired from the standpoint of good roads. On account of the rugged character of much of this region and the abundance of chert and other rocks, the roads are often very rough. In a great many places they are badly washed and gullied. It should be stated, however, that in and near the towns, as well as in some of the more important rural sections, the roads are, as a rule, fairly good. The crossroads and other less important ones are naturally in worse condition than the average highway that connects points between which there is much travel, but it is also true that much of the fruit must pass over secondary roads.

The "road factor" has a very close and intimate relation to the success of the fruit interests of any region. Its importance is often largely overlooked.

#### PRESENT POMOLOGICAL STATUS OF THE OZARK REGION.

An extended account of the fruit-growing interests as they now exist in this region is not called for in the present connection, though a few general observations will be of interest to the reader. They will also be of assistance to him as he considers the discussion of varieties which occurs on subsequent pages.

The present extent of the apple and peach interests is indicated under "Introduction." Numerous relatively small orchards have existed in practically all sections of this region for many years, but the extensive commercial development which has occurred during the past 20 or 25 years is generally considered to have had its beginning, at least in southern Missouri, with the planting of the orchards on the Olden Fruit Farm (now the Olden Fruit Co.) at Olden, Mo. In 1885, following the building of the Kansas City, Fort Scott & Memphis branch of the St. Louis & San Francisco Railroad (now operated as a part of the Frisco System), the late Col. J. C. Evans, as the leading spirit of the enterprise, associated with others, made the first plantings on the Olden Fruit Farm, which has

subsequently become one of the most extensive orchards in this entire region. This orchard, however, has not proved a financial success. The planting of commercial orchards at other points in the Ozarks rapidly followed. Probably there were relatively greater orchard interests in northwest Arkansas at the time the Olden Fruit Farm was established than there were in Missouri, though the rapid growth of apple planting in the former section was largely influenced by the building of railroads, which made possible good transportation facilities. The impetus began about 1881 or 1882. The plantings in eastern Oklahoma are more recent, most of the orchards having been set out during the past 12 or 15 years.

Nothing in the whole history of the fruit industry in this country better typifies the American propensity for doing things on a large scale than the size of the orchards in the Ozark region. Comparatively few of the commercial orchards contain less than 40 acres. Orchards of 80 and 160 acres are common, while those containing from 250 to 500 acres are not unusual, and several holdings of even a larger acreage under a single management exist in this region. The planting of such extensive orchards has been unfortunate in many instances. Mistakes in selecting orchard sites, in planting the trees, and in their subsequent management were rather common in the earlier days. Many large orchards were planted by owners who knew nothing about their care and management. Others used all their available funds in buying land and setting out the trees, then were without the necessary capital to properly care for the orchard until it reached a profitable age. While such errors doubtless would be largely avoided in future plantings, as a result of past experience, nevertheless the mistakes made in the older orchards materially affect present conditions.

Other fruits than apples and peaches are also grown here to some extent. Pears, plums, and cherries are produced, though sparingly—probably not enough to supply local demands. Grapes are grown at a few points in considerable quantities. Small fruits, including raspberries, blackberries, dewberries, and strawberries, are grown in some sections—strawberries on an extensive scale. Probably strawberry culture, especially at certain points in southwestern Missouri, and in the northwestern part of Arkansas, where it has become an important commercial fruit, has been more uniformly profitable with a majority of the growers than any other type of fruit culture.

As the writers see the situation, the best interests of the apple and peach industries of some portions of this region will require that the size of the orchards be reduced to such an extent that it will be possible for the owners to give them the requisite attention necessary to maintain them continuously in the best possible condition. When

this is done the orchards will pass through many adverse climatic conditions without serious injury and will therefore be more regularly productive. That successful and profitable orcharding generally throughout the Ozarks may be possible in the future, as it has been at periods in the past, there does not seem to be adequate grounds for doubting. Nevertheless, some sections of the Ozark region appear to be better suited to a type of general farming than to specialization under methods which have prevailed in many instances in fruit growing. Some growers who at one time devoted their entire attention to fruit have already realized this to be a fact and are branching out into other lines of farming.

In this region there is very little stock raising or dairying; conditions seem to be exceptionally favorable for development in either direction. Many kinds of grass, clover, and other crops suitable for forage can be grown in abundance. In regions suited to both, dairying or stock raising and fruit growing make an admirable combination, provided properly arranged systems of crop rotation and farm management are in operation.

With a reduction in the size of the orchards wherever it may seem advisable, as suggested, and the establishment of well-proportioned stock and dairy interests which might be expected with a wisely planned cropping system to furnish a fairly regular source of income, it is believed that the agricultural conditions in general throughout the Ozark region would be greatly improved. With orchards of such size that they could be properly maintained even should there be successive crop failures for several years, the chances are that they would still provide a fairly satisfactory source of income which, though perhaps irregular, would represent a fair annual average.

In any diversified type of farming, however, where fruit growing enters into the combination, there is an almost inherent tendency among the majority of farmers to neglect the orchard if there is conflict between it and other crops that require attention. It is therefore especially pertinent in the present connection to emphasize what has already been said regarding the adjustment of the cropping system so that no serious conflict in the requirements of the several crops shall occur. The reduction in the size of the orchards here suggested is solely with a view to making possible an intensive management of the smaller ones, where it is practically an impossibility so to manage the large ones of the present time. To reduce the size and still continue to neglect them would be to defeat entirely the object of making them smaller, as far as the success of fruit growing is concerned. This may result in the elimination of some crops commonly assumed to be essential to stock raising of any kind. But if close attention to the orchard results in its being profitable as

an orchard, it will be found, frequently, that the necessary feed which can not be grown without neglecting the orchard can be purchased out of the returns of a properly managed orchard and the transaction prove to be a very satisfactory one financially.

Should the size of the orchards be reduced as suggested, it might be desirable, or even necessary, materially to change the present methods of handling the fruit, basing such a change on a system of complete cooperation among the growers as is already being done in some of the best known fruit-growing regions in which the 5-acre or 10-acre orchard is the rule and the larger individual holdings the exception. It is probable that a much closer cooperation among the growers is desirable, and would prove highly advantageous under any conditions which the future may develop.

### THE PROBLEM OF VARIETIES.

#### CONSIDERATIONS GOVERNING SELECTION.

In the development of commercial fruit-growing interests in a new region, the matter of selecting the most suitable varieties for planting is one which must be considered from many different standpoints.

The ultimate object of the commercial fruit grower is to make his business financially profitable. To do this, as far as the matter of varieties is concerned, he must grow those which are reasonably prolific and which are sufficiently well adapted to the climate, soil, and other conditions existing in his region to insure a high degree of perfection in the development of the fruit. Not only this, they must also meet the demands of the market sufficiently well to induce the buyer to pay a satisfactory price for them. A variety may develop to its highest perfection and yet not be profitable to grow commercially because it does not produce enough fruit or because other characteristics that it possesses result in the prices that can be obtained for it at the time it must be offered for sale being insufficient to net a margin of profit to the grower.

It is frequently difficult or even impossible to foretell just how a variety will behave in a region where it has not previously been grown or in a new set of conditions under which it has not been tested. The avoidance of costly mistakes in selecting varieties for a new region is therefore largely dependent upon the knowledge one has of their range of adaptability and of their behavior under conditions which are most nearly comparable with those in the new region.

As applied to the Ozark region, it is probable that a considerable number of varieties have been planted extensively which are not proving as profitable as other sorts which are being grown to only a limited extent. There are still others which at present are but little

known or entirely unknown in this region and which should be thoroughly tested because of their probable value for this region.

There is a sentiment with many of the growers and others that more attention to the culture of summer apples would prove profitable in this region. The demand for such apples has greatly increased in recent years.

The following account of the principal varieties of apples and peaches grown in the Ozark region is offered in the hope that the information may be useful, especially to those who are not familiar with the conditions, in selecting varieties for future planting.

#### IMPORTANT VARIETIES OF APPLES.

In the following varietal notes an effort is made to state concisely the behavior of each variety mentioned and to give some estimate of its value for the Ozark region. This information, as already stated, is the result of several seasons' study of the conditions and the behavior of the varieties from year to year. The experience of the growers and their opinions and estimates of the different sorts are also taken into account in formulating the summaries that are made.

A remarkably large number of varieties, some of them of much value, have originated in this region. This statement applies particularly to northwestern Arkansas, though seedling varieties of value have appeared in many other sections. Such recognition is given these varieties as space permits.

On account of the large number of varieties which are grown in this region some discrimination is necessary in selecting sorts for discussion. Space limitations forbid reference to all of them. As far as possible the varieties included consist (1) of the sorts which are widely grown, (2) of those now grown only to a limited extent but which appear to be of such value as to warrant more extensive recognition, and (3) certain faulty varieties which are considered likely to be planted without a full knowledge of their tendencies.

##### **Ada Red.**

This variety originated about 1890 on a farm located 6 or 7 miles northeast of Springtown, Washington Co., Ark. Its history, as given to the writers in 1907 by Mr. A. G. Philpott, who planted the seed from which the original tree grew, is as follows:

One day, some 18 or 20 years previous, when he was working in a field his daughter brought him two apples, which he ate. They were either Red June or Summer Queen,<sup>1</sup> he is not sure which. One of these apples contained three especially plump seeds, which he planted in a fence corner. The next season these seeds grew and later were grafted to Summer Queen.<sup>1</sup> In grafting, the earth was removed from the crown of the trees and the tops cut off somewhat below the surface. In order to mark the spot where one of these grafted stocks was, Mr. Philpott stuck into the ground beside it one of the tops which he had cut off. This top, which was a mere switch 18 or 20 inches long, formed roots and grew.

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<sup>1</sup> The exact identity of the variety referred to as "Summer Queen" is uncertain.

A year or two later when setting out an orchard, Mr. Philpott took up the grafts and with them the "rooted top" and gave them a permanent place in the orchard. Before the latter bore fruit the owner of the place sold it to his niece, Mrs. G. A. Stevenson; the same year, however, it produced its first fruit. It appeared to give promise of value and was then named Ada Red in honor of Mrs. Stevenson's daughter, who bore the name Ada.

It was evidently about 1898 or 1900 that Mr. T. C. Brannon, whose place joins the one on which the original tree stands, became interested in this variety and made about 30 grafts from it. These were the first grafts made from the original tree. Ten or twelve of these Mr. Brannon planted in his orchard, and later he planted 100 or more younger trees of the same variety. It has been propagated only in this local way but has become somewhat widely known in the section in which it originated.

Some of the trees, as well as the fruit characteristics, suggest very strongly the probability of Red June parentage. As the seed from which the original tree grew may have come from an apple of that variety, according to Mr. Philpott's statement, the likelihood of such a parentage is still further strengthened.

The original tree as it appeared July 26, 1907, is shown in Plate II, figure 1. This tree is in a somewhat depleted condition, but the younger trees in Mr. Brannon's orchard show a good degree of vigor and general healthfulness. Some of the younger trees twig-blighted slightly in 1907, but it is claimed that this had not previously occurred. The foliage is generally strong and healthy. (Pl. II, fig. 2.) It is occasionally attacked by some of the leaf-blight fungi, but not more seriously than a great many other sorts.

The original tree has borne annually, at least it has made an attempt to bear every year since it produced its first crop. The older trees in Mr. Brannon's orchard bore their first crop when four years old.

The fruit is described as medium or above in size, roundish; under color yellowish but nearly covered with red and broken stripes of purplish crimson; dots indistinct, small; flesh whitish; texture fine, tender; flavor mild subacid; quality good. In the vicinity of its origin its season is about the middle of August. During the two seasons of 1906 and 1907 the fruit was badly attacked by apple scab where not sprayed, but it is claimed that this has not usually been the case. It is said to be excellent for culinary purposes, becoming soft and pulpy after cooking a very few minutes.

There appears to be a growing demand in the Ozark region for a variety ripening at the season of Ada Red and it is sufficiently promising to warrant thorough testing in all sections of this region.

#### **Akin.<sup>1</sup>**

This variety is grown in only a few orchards in the Ozark region, but it is considered one of the more promising of the sorts now little known which in recent years have been attracting the attention of fruit growers.

The tree is a strong, very upright grower. The fruit is roundish, slightly ribbed; size, medium; under color yellow, washed over almost the entire surface with bright crimson; flavor mild subacid; quality very good. Season, December to April when held under favorable conditions for keeping.

In this region thus far it has not proved uniformly productive though some of the older trees have borne heavy crops. It is quite probable that trees now 10 to 12 years old which have not as yet set much fruit may become more prolific as they increase in age.

#### **Arkansas.** Synonym: *Mammoth Black Twig*.

In the year 1840, or a little later, John Crawford settled at a point in Washington County, Ark., about 2½ miles northeast of what is now Rhea. He brought with him

<sup>1</sup> For a complete history and description of this variety, see Yearbook of the Department of Agriculture for 1903, p. 268.

seeds of the Limbertwig and the *Black Twig*<sup>1</sup> apples. These seeds were planted and from one of them grew the tree which was later named Arkansas, though it is almost universally known among apple growers by its synonym *Mammoth Black Twig*.

According to Mr. G. W. Collins, of Lincoln, Ark., who assisted in making the first grafts of this variety, it was not propagated until 1869. Its fruit was exhibited among other Arkansas varieties and seedlings at the Cotton Centennial Exposition which was held at New Orleans in 1884-85, attracting considerable attention. Since 1885 it has become widely distributed in many sections of the country. In this region it is known to nearly all fruit growers.

The tree is one of the best, making a fine, vigorous, spreading growth, but it is seldom sufficiently productive to render it a profitable commercial apple, even though the fruit has excellent shipping and keeping qualities. The fruit is large, highly colored, and compares favorably in quality with the Winesap and others of that group, but its lack of productiveness is a serious fault. In an occasional season it appears to be more productive throughout this region than in most seasons, and in the same orchard different trees often vary greatly in productiveness in the same year. But a heavily loaded tree is unusual. While there may be some tendency to increase in productiveness as the trees get older, this has not yet become very marked in this region.

On account of the vigor of the tree, checking the growth by root pruning and girdling have been tried in an experimental way in a number of instances with a view to increasing its productiveness. While the results have given some promise, they do not appear to offer a dependable remedy for the fault. For a similar reason, a soil not too rich in nitrogen is probably to be preferred to one which is likely to induce an overabundant growth. While there may be an occasional crop sufficiently large to be profitable to a satisfactory degree, the planting of this variety extensively in this region for commercial purposes does not appear to be warranted at the present time.

The original tree as it appeared in August, 1906, is shown in Plate III, figure 1. A well-pruned 10-year-old tree is shown in figure 2 of the same plate.

The Arkansas has been considerably confused with the Paragon, an apple of Tennessee origin. Though very similar, the two varieties are undoubtedly distinct.

#### **Arkansas Black.**

This variety originated on the farm of a Mr. Brathwait, 1½ miles northwest of Bentonville, Ark. It first fruited about 35 years ago. It has become of some importance in a few sections of the country, but it is not popular in the Ozark region. It is known to a large proportion of the growers, but has not been planted extensively. Like the Arkansas, it usually bears only very small crops. Its foliage is often badly attacked by some of the leaf-blight fungi and the fruit is so susceptible to apple scab that it usually becomes entirely worthless unless very thoroughly sprayed. When it is well developed it is a long-keeping apple and has good shipping qualities, but on account of its serious faults it is of very little value in this region under usual methods of culture.

#### **Arkansas Pippin.** Synonym: *Mammoth Pippin*.

This variety is known in this region by its synonym rather than as Arkansas Pippin. It is in a comparatively small number of orchards in northwestern Arkansas and southwestern Missouri, but is grown to only a very limited extent. It is a large, light-colored apple, ripening the last of August and early in September. Though it occasionally produces good crops of fairly good fruit, it is not as a rule considered a heavy bearer; neither is it especially prized as a commercial sort. Other varieties of about the same season and well adapted to this region are doubtless more profitable.

#### **Beach.** Synonyms: *Lady Pippin*, *Apple of Commerce*.

The original tree of this variety stood on the Oliver Young farm, about one-fourth of a mile west of Bentonville, Ark. It was a small tree of uncertain age during the Civil War; it is known, however, to have produced fruit three years after the war closed

<sup>1</sup> This variety was probably Winesap, which is known in some sections as *Black Twig*.

Nearly 40 years ago Mr. H. Highfill obtained scions of it from Mr. Young for propagation under the name *Lady Pippin*. From Mr. Highfill's nursery it was distributed more or less in northwestern Arkansas, though it does not appear to have attracted much attention for a considerable period. Some years after it was first propagated, trees of it which had come from the Highfill nursery were found on a place owned by a Mr. Beach. Because of this association, some one named it "Beach," either not knowing that it already bore another name or else in disregard of that fact. More recently it was renamed *Apple of Commerce*.

As the name first given to this variety does not conform to the code of nomenclature of the American Pomological Society, which is quite generally recognized by American pomologists in naming varieties, "Beach" becomes the approved name.

This variety is found in many orchards in northwestern Arkansas, but it is of secondary importance. It is not often found in other sections of the Ozark region. It has been widely advertised in recent years under the synonym *Apple of Commerce*.

The tree grows well and is considered a heavy bearer, but the fruit, though attractive in appearance, has several faulty characteristics. It is rather small, as a rule, and considerably subject to a soft rot and also to bitter-rot. The dessert quality is rather poor. Its chief points of merit are its lateness in reaching maturity for harvesting and its long-keeping qualities.

#### **Baldwin.**

Though this variety is the leading commercial winter sort in the northern apple districts from New England westward to Michigan, it is entirely out of its geographical range of adaptability in the Ozark region. It ripens or drops in August or early in September, has a soft texture, and is undesirable in nearly every particular. Fortunately, it is found in only a few orchards.

#### **Ben Davis.**

Based on the relative number of trees in the Ozark orchards, the Ben Davis apple is by far the most important variety which is grown in the Ozark region. Probably from 50 to 75 per cent of the entire number of trees in the commercial orchards consist of this variety. This statement, however, does not necessarily indicate its relative value. In fact, there is such diversity of opinion in regard to its actual merits, and considered broadly in its relation to the whole apple industry, the matter is so far-reaching that it is difficult to define the position which it actually holds. Its real position may not be the one commonly ascribed to it.

On the one hand, one grower claims that the Ben Davis is the most profitable variety that he can plant, not because of the high prices for which it sells, but because of the relatively large quantity of fruit which the trees bear—or which he expects them to bear. On the other hand, another grower could not be induced to plant this variety on account of its poor dessert quality and his jealous regard for the reputation for high quality of his fruit on the market.

These two positions represent the two extremes which growers commonly take regarding this variety. It is quite probable that some intermediate position represents more accurately its real value in this region. That there is a place for this variety and others of its group can hardly be denied, though its place should be more clearly defined than at present.

As to the adaptability of this variety to the conditions in the Ozarks, there can be no question concerning its fitness, since in seasons which are favorable to the development of any variety, this one usually reaches a high degree of perfection. During the unusual climatic conditions of the past few years, however, other varieties, especially Jonathan, have borne as regularly.

The rather extravagant claims which are sometimes made regarding the high dessert quality which the Ben Davis develops in this region can not be generally accepted aside from the fact that in texture, juiciness, and in other particulars the fruit from

this region is markedly superior to that grown in a region which is not within the geographical range of the variety.

The tree is generally a vigorous grower, though the foliage is often badly injured by fungous diseases. Bitter-rot and apple blotch are apt to be very serious on the fruit unless thoroughly sprayed. A Ben Davis apple tree, fairly typical for its age in this region, is shown in figure 1.

Great quantities of Ben Davis apples, especially the lower grades, are evaporated in the Ozarks. They make a particularly white stock, attractive in appearance, but

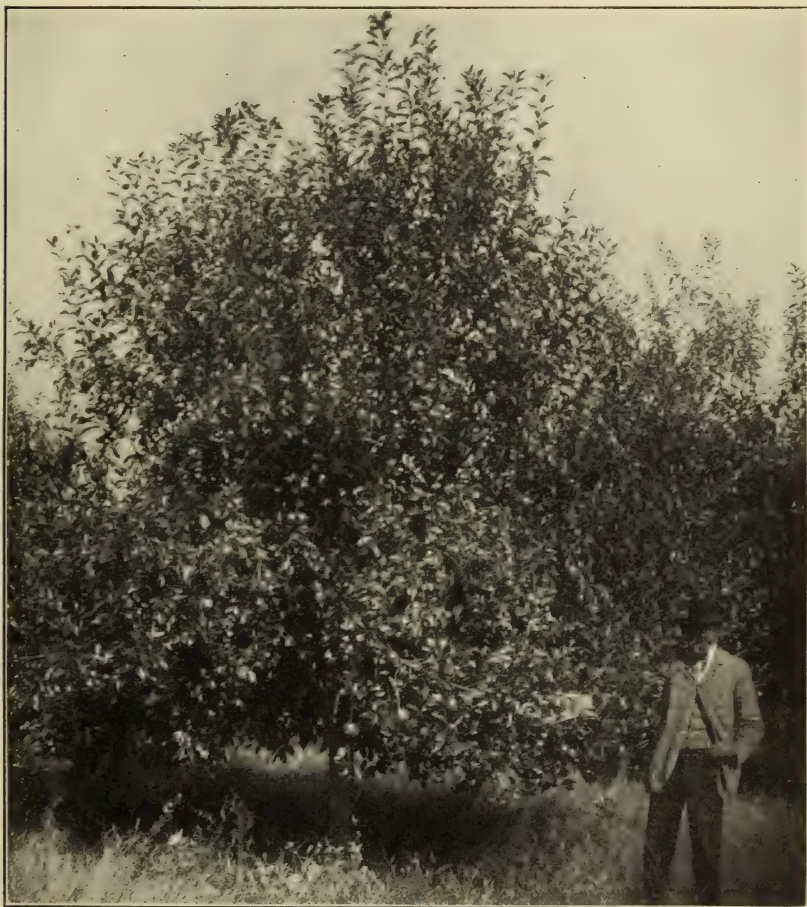


FIG. 1.—A tree of the Ben Davis apple in northwestern Arkansas at the age of 10 years. It is fairly typical of young trees of this variety in the Ozark region.

in dessert quality the evaporated fruit is not better, relatively, than that of the fresh fruit.

Considered in its broad relation to the whole apple industry, the growing of immense quantities of a variety which is recognized as being of such poor dessert quality as is the one in question is a matter which touches every phase of the apple industry. If it were grown and sold only as a cooking apple, the matter would assume a different aspect. In general, it may be stated as a fundamental economic proposition that any commodity of poor quality placed on the market in large quantities for a long period will

ultimately work injury to the enterprise which it represents, however important the enterprise may be.

The Ben Davis apple has repeatedly been placed upon the market in large quantities. At times in many markets scarcely any other sort is to be had in quantity. Its attractive appearance, however, which is widely recognized as the thing which sells it, does not conceal its quality from the purchaser at the time of consumption. He may not know that his last purchase of apples was of the Ben Davis variety, for he does not know varieties; he knows only "red apples," or "yellow apples," or apples possessing some other general characteristic. But he has had these "red" apples often enough to convince himself that he cares very little for apples and is indifferent, at least, as to whether he renews his supply. In a great number of instances, this variety doubtless largely establishes in the mind of the consumer his conception of what apples in general are, and his likes and dislikes, or his indifference, as the case may be, are measured thereby. If by chance he buys from his grocer a supply of some variety of high quality, his impulse is to secure more at once before they are all sold. High dessert quality thus creates a demand for more. At the present time increased consumption of fruit by every legitimate means is one of the most important things for the grower to keep in mind.

The ultimate test of a variety is the attitude of the consumer in regard to it, the prices he can be induced to pay for it after its merits become known, and the demand which it creates.

The "Ben Davis question," however, is important because of the extent to which the variety is grown. In the future development of apple culture in this region this variety as well as the others of its group will probably have a much less important place than it has had up to the present time.

If this course of reasoning is sound, the true position of the Ben Davis variety in relation to the apple industry is apparent and calls for no further argument in the present connection. The grower when reserving a supply of apples for his own use, if he has a general collection of varieties, rarely retains this sort unless it be for use after his other varieties of better dessert or culinary quality are gone. Why, then, should the city consumer who buys his apples by the peck or half peck be expected to esteem it any more highly, relatively, than the grower does?

Many buyers discriminate against the Ben Davis. Frequently they take it only because of the more desirable sorts which can be secured in the orchards in which it occurs. This variety stands for a generalized type of apple culture as opposed to the production of particular varieties, with a view to developing them to a high degree of perfection for a special trade.

#### **Benoni.**

Only a few orchards in the Ozarks contain this variety; those in which it has been observed are in southwestern Missouri, where it usually reaches a high degree of perfection and is highly prized in its season.

The fruit is small to medium in size; color yellow, washed with mixed red and broken stripes of crimson; quality very good; season in southwestern Missouri, July, about 10 days to 2 weeks later than Red June.

Though but limited observation of this variety has been possible, it is considered worthy of critical consideration by those who desire an early variety having the size and other characteristics of this one.

#### **Clayton.**

This variety is quite generally distributed in this region and occurs in many orchards, though it has not been so extensively planted as many other sorts. Unless the soil is particularly rich and deep and the trees are given good care, they make a rather poor growth and often have a stunted appearance, with strikingly light-colored foliage.

Different trees of this variety have thus far shown considerable irregularity in bearing, even where trees stand side by side in the same orchard. A fair average degree

of productivity is indicated, some trees producing heavy crops and others bearing very lightly. The fruit is frequently borne in large clusters. When this occurs many specimens are small and inferior. Though this variety has thus far been disappointing to some of the growers, where conditions are favorable the fruit develops to a good size, is attractive in appearance, and "good to very good" in dessert quality. It is usually harvested about with the Ben Davis and is said to keep well in cold storage.

In one orchard in 1908, in which the fruit of nearly all varieties was destroyed by severe climatic conditions in the spring, this sort was one of the few that produced a partial crop of fruit.

Where the soil is sufficiently rich and the orchard properly managed, other conditions being favorable, this variety can probably be made of much greater value in the Ozark region than it has been thus far in most cases.

#### **Coffelt.**

This variety originated with Mr. Wyatt Coffelt in Benton County, Ark. It has been propagated to some extent, though it has never been extensively planted in this region and apparently is not much esteemed by those who are acquainted with it. In a few instances it has been profitable, but as a rule it is of comparatively little importance. Though of fairly good dessert quality and a good keeper, it is only medium in size and rather dull in color. There is nothing special to commend it for planting, especially as more desirable sorts are available.

#### **Collins.** Synonyms: *Collins's Red*, *Champion Red*, *Champion*.

The original tree of this variety is doubtless a chance seedling and stands in a field 5 or 6 miles north or northwest of Lincoln, Washington Co., Ark., on a farm owned (in 1906) by Mr. Samuel Holt. In 1867, Mr. G. W. Collins, of Lincoln, who later became much interested in varieties of local origin, sowed wheat in this field. It was then a small scrubby tree perhaps 1½ or 2 inches in diameter. This tree, as it appeared in August, 1906, is shown in Plate IV, figure 1. A 12-year-old Collins tree is illustrated in figure 2 of the same plate. It has been propagated commercially since about 1886; is planted to a considerable extent in northwestern Arkansas, but not generally grown in other sections of the Ozark region.

The tree is not a particularly vigorous grower, but is usually healthy. It begins fruiting quite young in northwestern Arkansas and is one of the most regular and abundant bearers among commercial varieties.

The fruit is usually not above medium size; but if the trees are not overloaded it is quite uniform and less subject to the common fungous diseases than most varieties. Under favorable conditions it colors highly and keeps well. Its greatest fault is its poor dessert quality. Otherwise, it appears to have much merit for extensive planting in this region.

#### **Etris.**

The tree to which the name Etris was first applied stood in the orchard of Mr. A. K. Etris, 5 miles east of Bentonville, Ark. It was obtained about 1873 or 1874 from the Brathwait nursery, located near Bentonville. While it has been claimed that this tree was a seedling, the statement, if true, that another buyer<sup>1</sup> obtained trees of the same variety from the nursery at the same time Mr. Etris obtained his tree, indicates that the one which first received the name Etris could not itself have been a seedling. In tree and fruit characteristics Etris so closely resembles Gano as to suggest a very strong probability of the two sorts being identical.

A few orchards in this region, mostly located in northwestern Arkansas, contain the variety under this name, but its distribution has been quite limited.<sup>2</sup>

<sup>1</sup> Stinson, J. T. Preliminary Report on Arkansas Seedling Apples. Bulletin 49, Arkansas Agricultural Experiment Station, 1898, p. 11.

<sup>2</sup> See under "Gano" for a further discussion of varieties of this type.

**Florence.**

The tree from which this variety was first propagated in this region stood on a farm owned by the late W. E. Buchanan, about 3 miles south or southeast of Bentonville, Ark. This particular tree is generally assumed to be the original one, but as it died several years ago and has since been completely destroyed and the accounts obtainable relative to it are somewhat conflicting, definite historical data are wanting. The statement, however, that it was of considerable size prior to the Civil War appears to be unquestioned.

It is said to have been first propagated commercially about 1891 or 1892 by Mr. J. J. Britt, of Bentonville. It has not been extensively planted, but it appears to possess



FIG. 2.—A tree of the Florence apple in northwestern Arkansas at the age of 14 years; propagated from the original tree. The low head is characteristic of Ozark apple orchards.

much merit for the Ozark region. So far as observed, the largest orchard of it is located on the Buchanan farm already mentioned. This orchard consists of 30 to 35 acres, the oldest trees of which are now about 20 years old. A typical tree is shown in figure 2.

The trees are strong, vigorous growers and thus far appear to be remarkably healthy, with excellent bearing tendencies. The fruit is large, roundish in form, and smooth except for slight undulations of the surface and sometimes more or less ribbing; color, yellow, washed over most of surface with bright mixed red, and splashed with broken stripes of purplish crimson; flesh yellow, medium coarse in texture, breaking, juicy,

subacid, aromatic; quality good to very good. Its season for harvesting is about the middle of August or nearly with Jonathan. It keeps fairly well for an apple of its season, but probably does not hold as well in storage as Jonathan does. On account of the vigor and healthfulness of the tree and the similarity of the fruit in its more general points, some growers have thought that Florence might be grown as a substitute for Jonathan, its preference over that variety being primarily because of the vigor and healthfulness of the tree.

Though not yet grown widely enough for its range of adaptability to have been determined, it has sufficient promise to warrant very careful consideration in future plantings throughout the Ozark region.

#### Gano.

The history of the Gano apple since this name was first applied to it is a matter of definite record, but the source of the original tree of the variety is uncertain. In a manuscript left by the late Charles Downing there appears, under date of February 4, 1884, a statement which was made to him by Mr. W. G. Gano, for whom this variety was named, as follows: "The Missouri Valley Horticultural Society has named the apple 'Gano.' We found it many years ago in an old orchard with many others we can not name. The orchard was set out some 40 years ago by one Eli Jacks, 4 miles north of Parkville, Platte Co., Mo., planting seedling sprouts. These he grafted old varieties into 10 years after. This tree, however, shows no signs of being grafted, so we conclude that it is a seedling. \* \* \*"

It appears that this "Jacks orchard" was set out in 1844 and came into the possession of Mr. Gano in 1869.<sup>1</sup>

Concerning the Mr. Jacks who planted this orchard, it is of interest to note that he formerly lived in Kentucky but emigrated to Howard County, Mo., in the early days, later going to Platte County. It is stated<sup>2</sup> also that older trees of this variety than those in Platte County are (or were) to be found in an orchard which Mr. Jacks planted in Howard County. Here it was known as "Jacks Red," though this name does not appear to have been published and is now practically obsolete.

This traces the history of the Gano apple to Howard County, Mo., but the source from which Mr. Jacks obtained it is still obscure. He may have brought buds or scions with him from his early home in Kentucky or he might have obtained it elsewhere. According to Mr. Gano<sup>3</sup> this variety was first propagated in 1871 or 1872 after it attracted attention in the orchard near Parkville.

Though planted much less extensively than the Ben Davis, the Gano ranks as one of the important commercial varieties in the Ozark region. A young Gano orchard is shown in Plate V, figure 1.

Its range of adaptability appears to be very similar to that of the Ben Davis; its points of merit and its faults are also the same in essential particulars. Being solid red in color, it is preferred to the Ben Davis by some growers and is considered by many to be the more profitable of these two sorts. The texture of the fruit and its dessert quality do not differ materially from the Ben Davis. Commercially, it may be considered a Ben Davis having a solid red color, and the general comments which appear under that variety are also applicable to it, though the apple buyers do not yet discriminate against it as they do against the Ben Davis.

In this connection some comments may be made with propriety regarding several varieties which may be referred to as the "Gano subgroup." Reference is made to Etris, Reagan, Black Ben, or Black Ben Davis and some others less commonly known which resemble Gano so closely that it is impossible to distinguish them with certainty. The history of most of these sorts, if not all, ends in obscurity, as does that of Gano.

<sup>1</sup> Report of the Missouri State Horticultural Society for 1897, p. 355.

<sup>2</sup> Report of the Missouri State Horticultural Society for 1894, p. 152.

<sup>3</sup> Report of the Missouri State Horticultural Society for 1889, p. 181.

In general, the known historical points are about as follows: A tree of an unknown variety is found bearing fruit having mostly Ben Davis characteristics but solid red in color. The name being unknown, one is supplied—in most cases the name of the man who owns the orchard. Perhaps the nursery from which the tree was obtained is known, but if so, nothing further as to its source. The tree may have come from a stock in the nursery which was not budded or grafted, or from one on which the bud or graft failed to grow, or the bud or graft may have come from some Gano tree. No one can say with certainty that it did not. But a new variety, at least a new name, has been added to the list, and confusion has been multiplied because of the close similarity of it to other varieties.

The double origin of varieties, that is, of varieties which appear to be identical in every essential particular, in widely separated places is not new in horticulture. The very close similarity to Gano of authentic Ben Davis seedlings establishes the fact that "double origin," from a practical standpoint at least, in the case of Ben Davis seedlings, may be regarded as somewhat common; and it suggests the possibility, or even probability, that Gano is a Ben Davis seedling. While the other varieties of the Gano type above referred to may or may not have had separate seedling origin, the fact still remains that in essential particulars they are so much like Gano that they may be made to fill commercially about the same place.

**Gilpin.** Synonyms: *Carthouse*, *Red Romanite*.

This variety is quite widely distributed in the Ozark region, but it is grown only in small quantities. It is found in the older orchards oftener than in those which have been planted in recent years and is usually referred to by one of its synonyms rather than by its correct name.

The tree grows well and in most orchards shows a fairly good producing habit, but the fruit is considerably subject to bitter-rot and other fungous diseases. Its strongest points of merit are its long-keeping qualities and its use for cider; the cider made from it is considered of particularly high quality.

Though fairly good fruit of this variety is produced in this region, it does not appear to be particularly well adapted to the conditions and should probably not be recommended for general planting.

**Givens.** Synonym: *Arkansas Baptist*.

This variety originated as a chance seedling about 30 or 35 years ago on the farm of Mr. John Givens, located 6 or 7 miles east of Gentry, Benton Co., Ark.

The name *Baptist* or *Arkansas Baptist* was first applied to this variety because of the fact that Mr. Givens was an ardent supporter of that denomination. It was afterwards named Givens and is now seldom referred to by any other name.

It was first propagated by Mr. H. Highfill, of Benton County, and is quite widely distributed in northwestern Arkansas, where it has become of considerable importance. It is not much grown in other sections of the Ozark region.

The tree is a fairly strong, upright grower, with tendency to bear heavy and regular crops. The fruit is medium or above in size, rather highly colored when fully ripe, and its season of maturity is late. It develops in both size and color considerably after most of the other commercial varieties are nearly ready to harvest. Extensive growers who require a long period of time in which to harvest their fruit, usually look upon a succession in the "picking maturity" of their varieties as an important feature. Givens is one of the most satisfactory sorts now being grown in this region with which to extend the picking season. It is not of high dessert quality but better than many other sorts which are much more extensively grown. Though rather subject to bitter-rot, it is doubtless of sufficient value to warrant any attention to spraying that may be necessary in order to control that disease. Some growers consider it one of the best of the newer sorts, and it is probable that it might be grown profitably in this region more extensively than it is at present.

**Golden Russet (N. Y.).**

Occasionally this variety is found in the older plantings but usually in "family orchards" where only a tree or two of each sort was planted. The tree grows vigorously and bears abundantly and quite regularly in sections which are favorable to apple production. The fruit develops a comparatively high degree of perfection in appearance. Though it may lack somewhat in dessert quality in comparison with fruit of this variety grown in the North, where it would be expected to reach its highest dessert quality, it yet retains much of this quality in the Ozark region. Though it can not be recommended for extensive planting, it may be sufficiently desirable as a late fall variety to be given a place in home orchards, especially in the northern sections of the region.



FIG. 3.—Trees of the Grimes apple in southwestern Missouri at the age of 8 years. The trees are too close together in the row and should be thinned out. The tops of the trees are also too dense.

**Grimes.** Synonym: *Grimes Golden*.

This variety ranks as one of the important commercial sorts in the Ozarks. In the portion of the region lying between the Missouri and Arkansas Rivers it is widely and extensively grown and is generally considered a profitable variety.

The tree is said to be short-lived here, as in most sections where it is grown, but it makes a rather vigorous healthy growth, without any particular faults. Fairly regular crops are expected, though there is frequently considerable variation in the amount of fruit borne by different trees in the same orchard. It is usually rated as a fairly productive sort. The fruit is borne largely on interior branches of the tree. This distribution of the crop through the tree makes possible the production of heavy loads of fruit without seriously breaking down the branches and avoids also the need of providing means to prevent it. Typical trees of the variety as it grows in the Ozarks are shown in figure 3.

In some instances twig-blight and blossom-blight have been somewhat severe, but, as a rule, these difficulties have not caused serious loss. The fruit, however, appears to be rather susceptible to injury from the curculio, and frequently the loss on account of low-grade fruit caused by curculio stings is considerable, especially in orchards that are not well maintained.

Certain special adaptations have been noted. In one orchard near Neosho, Mo., there has been some indication that it bears better on "prairie soil" than it does on Clarksville stony loam. It is also claimed that the areas of the more extensive soil types in this region which are most highly impregnated with iron oxid are preferable for it than the soils which are less red in color. South of the Arkansas River the Grimes is seldom seen, but in the few instances where it has been observed it does not appear to be as well adapted to the conditions as it does farther north, except at the higher points. The fruit does not develop as well, and the texture and flavor seem to deteriorate. Further observation, however, is necessary to verify these impressions before unqualified statements relative thereto are warranted.

The Grimes apple is usually harvested in the Ozark region during the last of August and early in September and placed at once in cold storage either by the buyers or by the growers themselves if they do not sell the fruit before it is picked.

In future plantings in this region this variety will probably maintain its present position in relative importance. Possibly, as consumers become better acquainted with it and demand a variety of high dessert quality, even if it is not a "red apple," it may be grown profitably in larger quantities than at present.

### **Hastings Red.**

This is a variety of the Gano type; it closely resembles that variety and would doubtless pass for it commercially. As in the case of several varieties of this type, the Hastings Red appeared as a single tree in a block of apples which were all supposed to be Ben Davis. The orchard in which this tree stood was located about half a mile northwest of Gentry, Benton Co., Ark., and belonged to William Hastings. The exact year in which attention was first directed to the tree, on account of the solid pinkish red color of its fruit, is uncertain. Mr. H. Highfill, who propagated it soon after it began bearing, states that it was probably during the years 1870 to 1875. The point of particular interest in connection with this variety appears in Mr. Highfill's experience in propagating it, as related by him in conversation with one of the writers. When the trees which he first propagated from the original one came into bearing, the fruit of about half of them showed a noticeable tendency to stripe similar to the Ben Davis, while the fruit produced by the others was solid pinkish red like the original. He propagated from some of the trees bearing the solid colored fruit and, so far as observed, these have all produced fruit colored like the parent, with no tendency to stripe when fully colored.

As is the case with several varieties of the Gano type, the source of the original tree is unknown and must so remain. The stocks on which were grafted the trees composing the orchard in which the original one stood may have been Ben Davis seedlings, and this particular seedling may have been overlooked in grafting; or the scion may have failed to grow while the stock continued to grow; or it may have been a case of bud variation from Ben Davis. On account of the manner in which the Ben Davis characteristics appeared in fruit from some of the trees which were grafted from the original, the last possibility has some support.

This variety does not at present occupy a prominent place as to commercial importance, though it has been planted in a considerable number of orchards, especially in northwestern Arkansas. As a commercial sort, its value is probably not materially different from Gano, which it closely resembles except in being a somewhat lighter shade of red in color. The claim is sometimes made that it is more juicy and of better

quality than Gano, but if there are any real differences in these particulars they may be regarded as slight. The comments under "Gano" are applicable to this variety.

#### **Highfill.**

This variety is a Ben Davis seedling, the seed from which the original tree grew having been planted by Mr. H. Highfill, in 1869, on his place near Springtown, Ark. It has been planted in a considerable number of orchards in the section in which it originated, though not extensively.

The tree makes a fairly good growth, though in some instances the foliage has appeared to be rather weak. A good amount of fruit sets when conditions are reasonably favorable, but close attention to spraying is necessary in order to produce fruit of good grade, as it is quite subject to bitter-rot and apple scab.

The fruit is medium in size, rather firm in texture, and of mild subacid flavor; dessert quality fairly good—considerably better than its Ben Davis parent. In a favorable season it colors very highly and has a heavy purplish bloom. Its season is about with Ben Davis.

Under high culture this variety might perhaps be of considerable commercial value in the Ozarks, but it can not be expected to give a very high degree of satisfaction if grown under neglected conditions.

#### **Holman.<sup>1</sup>**

This variety appears to be unknown to most Ozark fruit growers. It is said to have originated in Greene County, Mo., 3 miles east of Springfield.

It is interesting to note that this apple was introduced to the Missouri State Horticultural Society as a new variety by the society's committee on nomenclature at the same time that attention was formally directed to the Gano.<sup>2</sup>

In the Ozark region it has been found in only one orchard, located in Wright County, Mo., where it has been doing fairly well in comparison with the other sorts that are being grown and gives the impression of having sufficient promise to warrant thorough trial throughout this region. The fruit somewhat resembles the Smith Cider apple and is about the same in season as that variety.

#### **Horse.**

This variety, probably of North Carolina origin, is not an important commercial variety, yet it is quite widely grown, particularly in the Arkansas portion of this region. When it is handled commercially, the fruit is usually picked during the last of July and early in August. It is often marketed at southern points, particularly in some of the larger towns in Texas, with other early-ripening sorts.

It appears to be well adapted to Ozark conditions and is generally regarded as a profitable variety of its season.

#### **Howard Sweet.**

The original tree of this variety is said to have been obtained at about the close of the Civil War from the "Holt nursery,"<sup>3</sup> located in the vicinity of Canehill, Washington Co., Ark. It was probably a seedling which was planted for stocks but not grafted. The original tree was planted by a Mr. Howard, whose place was located near Cincinnati, Ark. The claim has been made by some that it is identical with Lady Sweet, but it is doubtless distinct. It has been planted considerably, but not widely disseminated, in the section in which it first attracted attention.

It bears good crops of large, highly colored, sweet apples which have a heavy bloom. In dessert quality it rates as good; season, winter.

It is apparently well adapted to Ozark conditions, and is worthy of consideration where a sweet winter apple is desired.

<sup>1</sup> This variety is distinct from one of North Carolina origin bearing the same name, which appears to have attracted some attention in Illinois a good many years ago.

<sup>2</sup> Thirteenth Annual Report of the State Horticultural Society of Missouri for 1887 (1888), pp. 261-262.

<sup>3</sup> For a more extended reference to this nursery see under "Wilson June," (p. 53).

**Huntsman.** Synonym: *Huntsman's Favorite*.

This variety was brought to notice by a Mr. Whetworth, of Missouri, who refers to it as follows:<sup>1</sup>

I brought it into notice in 1843. I found the apple in Johnson County. It was brought from Lexington. I went upon a visit to Cincinnati in 1844 and exhibited it there. They thought much of it and got some grafts. It is the finest apple in the county. A man named Huntsman moved to Missouri; he stopped at old Franklin; a friend gave him some seedlings he had raised; he planted them out, and this was one of them. The trees were 23 or 24 years old when I saw them. Mr. Mock, of Lexington, got them. They keep a long time. They are pale green, turning to a beautiful orange, clear. It was named after Mr. Huntsman, who grew it.

While some of the points in this historical sketch are not entirely clear, especially as to the locations referred to, it fixes the date of the origin as about 1820. It has been quite extensively planted in the commercial orchards of this region, especially in Missouri, and in this respect it ranks as one of the important commercial late fall and winter sorts.

The tree grows well, and it is productive under favorable conditions; but the fruit is very susceptible to bitter-rot and is frequently seriously attacked by apple scab, so that as a rule very close attention to spraying is necessary in order to protect the fruit from these diseases. When properly managed, it develops in this region to a high degree of perfection and is generally considered a desirable variety to grow, but it probably requires higher cultural conditions than most other sorts to bring it to perfection. The fruit is yellow, frequently with a bronzed blush on the exposed side; flesh yellow, subacid, rich; quality good to very good.

**Ingram.**<sup>2</sup>

This variety originated on the farm of Mr. Martin Ingram, located about 6 miles northeast of Springfield, Mo., from a seed of the Ralls, which was planted in the doorway about 1850 by his son, John B. Ingram. No particular attention appears to have been given to the original tree until it came to the notice of Mr. D. S. Holman, of Springfield, in 1864, when he found some good, crisp apples in March lying on the ground under this tree. Later Mr. Martin Ingram divided the scions from this tree among three nurserymen, D. S. Holman, J. M. Roundtree, and A. G. McCracken. It was understood that they were to sell the trees at the average price which was being paid for other varieties. The first commercial orchard of this variety was set out near Springfield by Mr. L. K. Haseltine, who now has about 250 acres of it. It has been widely planted in the portion of the Ozark region which lies between the Missouri and Arkansas Rivers.

The tree is very upright in habit of growth while young, but it becomes more spreading as it attains age and as the branches are bent downward by weight of the fruit. It has made a good reputation in this region for productiveness, though under usual cultural conditions it is quite distinctly alternate in its fruiting proclivities. Considerable irregularity in bearing among the trees in the same orchard has frequently been noted. This applies to the size of the fruit as well as to the quantity produced. The tree is generally healthy. A well-grown tree of the variety is shown in figure 4. In a few instances serious blighting of the blossoms has been observed, caused presumably by the same organism that produces twig-blight, but this does not appear to be a frequent occurrence.

The fruit is usually of medium size and "good to very good" in dessert quality. Like the Givens, it is very late in reaching maturity and makes considerable of its growth after most of the other late sorts commonly grown are ripe enough to harvest.

<sup>1</sup> Proceedings of the Missouri State Horticultural Society, 1868, p. 376.

<sup>2</sup> For a complete history and description of this variety, see Yearbook of the U. S. Department of Agriculture for 1901, p. 382.

It is one of the longest keeping sorts among the commercial varieties growing in the Ozarks and may be held till April and May or even later.

Like its parent, Ralls, it has a late blossoming period, and thereby often escapes late spring frosts and produces fruit when most other earlier blossoming varieties are seriously injured.

Under favorable conditions the Ingram attains a high degree of perfection in this region. The more productive trees, however, are apt to overbear. Doubtless the most profitable and satisfactory method of handling the trees is to maintain them



FIG. 4.—A tree of the Ingram apple in southwestern Missouri, about 12 years of age. This tree shows the upward tendency of the branches, which is very much more marked in trees that have not reached the bearing age. They become more spreading with age and weight of fruit.

under high cultural conditions and to thin the fruit as may be necessary. This course may be expected to keep the trees vigorous and to insure fruit of desirable size.

Properly handled, this variety is undoubtedly of sufficient merit to maintain a prominent place in the apple interests of the Ozark region. In propagating it, however, it seems advisable that scions should be carefully selected from trees which produce fruit of good size and in abundant quantity, in preference to trees that bear small apples.

**Jonathan.**

Very few varieties are grown more widely in the Ozark region than the Jonathan, and equally few are grown more successfully. Its relative importance is thus indicated. Considered from the standpoint of its intrinsic merits, it is a question if it is not the most valuable sort now being grown in this region in large quantities. This estimate of its value, however, is perhaps not the one which is commonly accorded to it, though it is a popular variety.

The tree is perhaps the weakest feature in regard to the variety. Though it ordinarily makes a fairly strong growth, it is frequently attacked quite severely by twig-blight; less commonly the same disease, presumably, has caused serious blighting



FIG. 5.—A tree of the Jonathan apple in southwestern Missouri, 9 years of age. The rather slender branches which characterize this variety may be noted. Systematic and judicious pruning would improve this tree.

of the blossoms. While blight seldom seriously endangers the life of the tree, its occurrence on Jonathan is frequent in comparison with many other varieties.

In sections where there are many cedar trees and "cedar balls" are abundant, the foliage has proved to be relatively susceptible to cedar rust. The fruit is quite susceptible to bitter-rot, and in unsprayed orchards heavy losses due to this disease often occur. In some places the curculio appears to work on it more than on many other sorts, causing a great many culls and much low-grade fruit. These difficulties, however, appear largely in neglected orchards, the ones maintained under a good system

of management being comparatively free from them. The habit of growth of the Jonathan tree is illustrated in figure 5.

Having some rather serious faults, Jonathan also has many strong points of merit. It is productive and under good cultural conditions quite inclined to bear annual crops. In numerous orchards in this region, during the past 6 or 8 seasons, it has been one of the best varieties to withstand adverse climatic conditions and has frequently borne relatively more fruit than almost any other sort.

While not a large apple, it is of desirable size, especially for dessert purposes, for which it is particularly valuable on account of its high quality. Under favorable conditions in this region, the fruit colors very highly and attains an exceptional degree of perfection. It has been found doing particularly well at certain points in the Ozark region south of the Arkansas River, reaching a rather unusual size. It is always in good demand and brings relatively high prices on the market. Though its normal season in this region is fall and early winter and it must be harvested rather early—that is, during the first half of September (some gather it during the last half of August)—the Ozark-grown fruit behaves well in cold storage if it is well matured when picked and stored very promptly. Its market season usually lasts until about February.

Its value as a storage apple was very clearly demonstrated—perhaps more clearly than it had ever been before—during the Louisiana Purchase Exposition at St. Louis in 1904, where, in the Missouri fruit exhibit, one of the writers examined in August, 1904, specimens of this variety from cold storage which grew the previous season. These specimens did not appear to have deteriorated in any marked degree. The color was brilliant, the flavor excellent, and the texture crisp, firm, and juicy.

The situation in regard to this variety is perhaps well summed up in a statement made to one of the writers by one of the most widely known and extensive orchardists in the Ozark region. This statement was to the effect that had he fully known in earlier years the merits possessed by this variety, half the trees he planted would have been Jonathan instead of Ben Davis.

#### **King David.**

This variety originated nearly 20 years ago on the farm of Mr. Ben Frost, located about 3 miles south of Durham, Washington Co., Ark. It has been widely planted in many sections of the country during the past few years. It is found in the Ozarks at present in only a few orchards.

The tree is a good grower so far as observed—usually better than Jonathan, with which this variety in many respects is more nearly comparable than it is with any other. The fruit grown under favorable conditions is medium to large in size; color yellow, washed with mixed red, a few indistinct stripes of dark crimson; flavor subacid, vinous; quality good to very good. Season apparently about with Jonathan.

While the plantings of this variety have not yet reached sufficient age to fully determine its value as a commercial sort, it is considered in general as promising, and if further experience substantiates present indications it will be likely to become an important sort in the Ozarks in the future. The original tree is said to have come into bearing young and to have made a good record for productivity for several years thereafter. Its subsequent record has been subject to the influence of many unfavorable climatic conditions.

#### **Kinnard.<sup>1</sup> Synonym: *Kinnard's Choice*.**

This is a variety of the Winesap type which is of much value in some sections of the South; but, judging from its behavior in the few orchards in which it has been found, it

<sup>1</sup> For historical information and detailed description of this variety, see Yearbook of the U. S. Department of Agriculture for 1910, p. 427.

is not well adapted to the section north of the Arkansas River. It is apparently prolific, but the fruit is so susceptible to apple scab that under neglected conditions nearly the entire crop is frequently lost. Probably thorough spraying would control this disease, but, so far as observed, it has shown no characteristics which make it promising except in the southern portion of this region, where the elevations are relatively low. In the South, where it is an important sort, no special tendency to scab has been observed.

#### **Kossuth.**

This variety is not widely known to fruit growers; in the Ozark region it is found in only a few orchards.

As far as observed, the tree is a strong and vigorous grower, with foliage comparatively resistant to the common leaf diseases.

Under favorable conditions it is apparently prolific, the fruit not much subject to scab or apple blotch, though sometimes badly attacked by bitter-rot unless adequately sprayed for that disease. The fruit is good size; yellow, striped and splashed with crimson; sweet or very mild subacid, and good to very good in dessert quality. In northwestern Arkansas it should be picked in early September and handled as a fall variety. By some it is considered profitable as an early fall variety. Wherever a variety ripening at this season is desired, it is apparently worthy of wider planting in the Ozark region than heretofore, though its sweet or nearly sweet flavor may be an undesirable characteristic in the estimation of many.

#### **Lawver.** Synonym: *Delaware Red Winter*.

This variety is widely distributed throughout nearly the entire country, but is not grown in large quantities. It has been observed in only a small number of orchards in the Ozark region, but in these, as in most orchards elsewhere, it bears so sparingly that it is of little or no commercial value and can not be recommended for general planting. The tree, however, is a strong, spreading, vigorous grower.

#### **Limbertwig.**

Many of the older orchards in some sections of this region contain this variety; but it is not grown extensively, and it appears to have no special merit when grown under the usual Ozark conditions. It is susceptible to apple scab and apple blotch, and unless very thoroughly sprayed for these diseases a large proportion of the fruit is frequently lost. Furthermore, it does not appear to be especially well adapted to the conditions in this region, as the fruit seldom develops to a high degree of perfection in comparison with its behavior in some other regions of the country in which it is grown.

When evaporated, the fruit of this variety is not as white, and consequently is less attractive in appearance than many other sorts; but it makes from 1 to 2 pounds more evaporated stock per bushel than most other varieties.

#### **Maiden Blush.**

Though not grown in large quantities, this variety is widely distributed throughout the Ozark region and constitutes one of the leading early-ripening sorts. The trees grow well, are not much subject as a rule to disease, and are usually productive to a satisfactory degree, other things being equal. Occasionally there is some twig-blight and blossom-blight, but these difficulties are not often serious. The fruit attains good size for the variety, is relatively free from disease, and develops a rather rich lemon-yellow color, frequently blushing considerably on the exposed side. It ripens in this region during the last half of July and early August. For home use, or for market purposes where an early ripening variety is desired, it is of considerable importance throughout the Ozarks.

#### **McAfee.**

This variety has been observed in a few orchards in the Missouri section of the Ozark region. While the tree grows well and the fruit develops to a fairly high degree of

perfection, it is doubtful if it has sufficient merit to recommend it for planting more widely. It is sometimes badly attacked by apple scab, and heavy dropping of the fruit commonly occurs.

**Minkler.** Synonyms: *Mumper*, *Mumper Vandevere*.

The original tree of this variety appears to have stood in a seedling orchard near Dillsburg, York Co., Pa., which was planted and owned by one John Mumper. This tree is referred to as having been of large size more than 60 years ago.<sup>1</sup> It was apparently introduced into Illinois in the form of scions<sup>2</sup> as early as the middle of the last century. The Illinois State Horticultural Society recommended it "for further trial" in 1860<sup>3</sup> and possibly even at an earlier date.

In Pennsylvania it was known at an early day as *Mumper Vandevere*, though it now appears that this name was not published until 1876.<sup>4</sup> In Illinois it was tentatively named Minkler, because it was grown by a man of that name (S. G. Minkler), evidently with the expectation that it would at some time be identified as a variety previously named and described.<sup>5</sup> Because of being the first published, the name Minkler is approved in accordance with the code of nomenclature of the American Pomological Society, even though another name was applied at an earlier date.

This variety is quite widely distributed throughout this region, though it has not been planted extensively. The tree makes a fine, vigorous, healthy growth—one of the best of any of the varieties grown in this region; the fruit attains good size and color and keeps well; but it has produced such very light crops, with almost no exception, that it is practically without value as a commercial sort in the Ozarks.

**Missouri.** Synonym: *Missouri Pippin*.

There is some conflict of statement regarding the origin of this variety. From the historical account<sup>6</sup> which appears to be the best authenticated, it originated as a seedling with Mr. Brinkley Hornsby at Kingville, Johnson Co., Mo., about the middle of the last century. This Mr. Hornsby was one of the early settlers in northern Missouri, going to that section from Tennessee. Having a great interest in fruit growing, he brought with him apple seeds from his native State, which he planted at his new home. His first orchard in Missouri was thus composed of seedling trees, the best varieties of which he propagated for distribution. Whenever a graft failed to develop, if the seedling stock on which it was worked grew and manifested promising characteristics, it was Mr. Hornsby's custom to let it remain until it fruited. It appears that the variety now under consideration was one of these stocks on which the graft failed to grow. The tree which developed therefrom fruited for the first time in 1854, but it was not until the crop of 1859 that Mr. Hornsby became satisfied with it. He had intended to name it "Missouri Orange," but finally accepted the suggestion of the late G. C. Brackett and called it *Missouri Pippin*, under which name Mr. Brackett received scions of it from Mr. Hornsby in the spring of 1861. It has become widely known and disseminated under that name.

One of the first, if not the first, published descriptions of this variety was by Warder in his American Pomology, under the name *Missouri Keeper*. It appears, however, that it was Warder's intention to adopt *Missouri Pippin* as its name in case he should revise American Pomology. Under the code of nomenclature of the American Pomological Society, the name *Missouri Pippin* is reduced to Missouri.

This variety has been widely planted in many sections of the country and has frequently been reported to be one of the most profitable of the commercial sorts. It

<sup>1</sup> Letter from Prof. S. B. Heiges, June 15, 1910.

<sup>2</sup> Letter from Mr. S. G. Minkler, Mar. 27, 1894.

<sup>3</sup> Transactions of the Illinois State Horticultural Society, 1860, p. 30.

<sup>4</sup> Downing, A. J. The Fruits and Fruit Trees of America, 2d revision, p. 59 of 2d Appendix.

<sup>5</sup> Downing, A. J. Op. cit., p. 276.

<sup>6</sup> Report of the Kansas State Horticultural Society, 1881, p. 269.

has been quite extensively planted throughout the Ozarks, but on the whole it has proved disappointing.

The tree makes an upright, characteristic growth, especially when young and before the rather slender branches become permanently bent down from weight of fruit. The leaves are also very characteristic, being quite long in proportion to the width, dark green, and more glossy than most sorts. These varietal peculiarities make the tree quite easily distinguished from other sorts.

The foliage is often seriously affected by some of the leaf and other fungi, so that unless thoroughly sprayed the trees are often badly defoliated early in the season. The twigs as well as the blossoms are frequently badly attacked by blight. When blossom-blight occurs, it is especially serious, as it prevents the fruit from setting. The tree is rather shallow rooted and the root system is not very abundant in most Ozark soils, so that it is blown over by the wind more often than most other varieties. This is frequently apparent in orchards of mixed varieties in which this one is included. Very early bearing is a characteristic, and on this account it has been in the past widely planted as a "filler." The tendency is toward heavy bearing; in fact, under favorable conditions, it often overbears, and the fruit is very small unless thinned. The fruit is normally not above medium size, highly colored, and with a beautiful finish, so that it is very attractive in appearance when well grown, though it does not rank high in dessert quality. It is very subject to apple scab, apple blotch, and bitter-rot. Unless very thorough spraying is done, heavy losses are apt to occur from these diseases, in some cases practically the entire crop being destroyed.

It will thus be seen that this variety, under Ozark conditions, has many serious faults. On the other hand, the early and abundant bearing of the trees and the attractive appearance of the fruit when well grown have given it considerable popularity in the past, though because of the prevalence and destructiveness of the diseases mentioned in orchards not adequately sprayed, it is not now regarded in this region with as much favor as formerly. In certain other regions of the country it is apparently of greater value than it is in the Ozarks. In still others where it was formerly planted it has been largely dropped in recent years on account of its susceptibility to blight and other diseases.

#### **Northern Spy.**

Few orchards contain this variety, though it is occasionally seen in this region. On account of its importance in the older apple districts of the Northern States, it is mentioned in the present connection.

In the Ozarks it is without value, so far as observed. It bears but very little; the fruit rarely holds to the tree until maturity; it rots badly even before ripening, and the specimens that do mature lack the size, color, and flavor which make this sort valuable when grown under conditions to which it is well adapted.

#### **Northwestern.** Synonym: *Northwestern Greening.*

In the upper Mississippi Valley, where hardness of tree with relation to low temperatures is an important matter, this variety is grown quite extensively and with considerable satisfaction. It occurs in only a few orchards in the Ozark region. In the orchards where observed it has proved very unsatisfactory, primarily on account of its susceptibility to the apple-blotch fungus. In unsprayed orchards this disease frequently renders the fruit nearly or entirely worthless, except for evaporating or for cider. Not only is the fruit susceptible to this fungus, but the trees are also sometimes greatly damaged by it—in some cases the twigs, branches, and trunks becoming so injured as to nearly or quite destroy the trees.

While this disease yields to proper spraying, it is doubtful if this variety would prove as satisfactory under Ozark conditions as others of its season. A winter variety in the upper Mississippi Valley, it becomes a fall apple in the Ozarks. While it is inclined to heavy bearing, it would be apt to drop badly even when not attacked by disease.

**Oldenburg.** Synonym: *Duchess of Oldenburg.*

This is a Russian variety which was introduced into this country through England in 1832 by the Massachusetts Horticultural Society. The fruit was first exhibited as home grown in 1839 by the elder Manning. It is now widely distributed in many sections of the country. The tree is a standard of hardiness where extremely low temperatures are a consideration. It is not extensively grown in the Ozarks, though quite widely distributed. The tree is a moderate grower, not especially subject to disease, and generally desirable in other respects. The limited observations which have been possible indicate that it is generally prolific and regular in bearing in this region when conditions are favorable. The fruit is medium in size; roundish oblate in form; yellow, washed and streaked with red. It is rather sharply acid and of value for cooking rather than for dessert purposes. For its season, which in northwestern Arkansas begins about the middle of July, it is promising for this region. With the increased interest in the growing of early apples and the active market demand for them which has obtained during the past few years, this and other early sorts well adapted to Ozark conditions are worthy of consideration.

**Oliver Red.** Synonyms: *Oliver, Senator.*

This variety originated<sup>1</sup> in Washington County, Ark., where it has been known for many years. During the past 10 to 15 years it has been more or less disseminated throughout the Ozarks and also in many sections of the country under the name *Senator*, though as a rule it has not been planted heavily by individual growers.

In the section above mentioned, where this variety has been longest known, numerous complaints are made about the tree. In many orchards, for no apparent cause, it presents a rather sickly appearance; the leaves are frequently small and yellowish; branches die and other difficulties appear which suggest lack of constitutional vigor. The foliage is also very susceptible to cedar rust. Some growers attribute this behavior of the tree to insufficient hardiness in the climate of northwestern Arkansas. As trees in the southern extremity of the Ozark uplift, where some of the climatic conditions may be a little milder than they are in northwestern Arkansas, appear to be rather more vigorous in some cases than they are farther north, at least when young, it seems possible that the tree may do better under other climatic conditions than those which prevail in the section where it originated.

Generally, throughout the Ozarks, it is fairly productive; but the trees appear to be quite irregular in this respect, some producing heavily while others bear sparingly. In the localities above referred to, however, where the trees appear to be more thrifty and vigorous, they are not as productive as they are in northwestern Arkansas. Most of these stronger trees that have been observed are under 10 years of age, and it is possible that they may become more productive later.

The fruit is medium to large; under color yellow, washed over nearly entire surface with bright mixed red, and faintly striped with dark crimson; flavor subacid, pleasant, and good to very good in dessert quality. In this region it is a fall apple and is usually picked early in September.

On account of its high quality and beauty of appearance this is a desirable variety where it can be grown successfully. Special methods of culture may be of some value in overcoming the faults that have been mentioned. It is considered worthy of more careful and thorough testing in this and other regions.

**Payne.** Synonyms: *Payne's Keeper, Payne's Late Keeper.*

This variety was brought to notice by the late J. G. Payne, Everton, Dade Co., Mo., on whose place the original tree stood. The principal points of historical interest connected with this variety, as related to one of the writers by a member of the firm of J. G. Payne Sisters, the business name under which the "Payne place" is now operated, are as follows: The original tree is supposed to have been one of a col-

<sup>1</sup> For more complete historical data see Yearbook of the Department of Agriculture for 1906, p. 357.

lection of seedling trees which grew from seed that was brought from North Carolina, about 1840, by a Mr. Cobla and planted on the Gasconade River, near Rolla, Mo. The season following the one in which these seeds were planted, the seedling trees were removed to the present Payne place near Everton. There were 336 of them. One of these, when it bore, produced very late-keeping apples.

In 1866 J. G. Payne and sisters bought the place on which this seedling apple orchard stood, taking possession the following year. In 1877 some of the apples from this tree which produced late-keeping fruit were exhibited at the meeting of the Missouri State Horticultural Society, held at Springfield, and at that meeting the name *Payne's Late Keeper* was applied to it.

The year following this exhibit, Mr. Payne had 100 trees propagated by John Warren, who was located 5 miles northwest of Springfield. Sixteen of these were given away by Mr. Payne; the others were planted on the Payne place. Fifty-six of these were still living in June, 1910. The original tree died the year following the propagation of this lot.

It has not been widely planted in the Ozark region, though in a small number of orchards it has been given considerable prominence. On the Payne place 226 acres are devoted to it.

The tree is said to be a poor grower in the nursery, but in the orchard it is usually fairly vigorous and satisfactory in habit of growth, frequently holding its foliage well when many sorts are showing much injury from leaf fungi. As a rule it produces regular and abundant crops, though it is rather late, in some cases at least, in coming into bearing. The fruit is less susceptible to the prevalent diseases of this region than a great many varieties are. It is medium and above in size; under color yellow, washed over entire surface with purplish crimson, and thin overspread of gray; flavor sweet, rich, good to very good. In season it is one of the notably long-keeping varieties of this region. Being a sweet apple, it is not likely to become as prominent as would a mildly acid variety having otherwise similar characteristics, since the demand for sweet apples is limited. So far as tested, it appears to be well adapted to Ozark conditions. Where an apple having the qualities possessed by this one is desired, it is worthy of consideration.

### **Pennsylvania Cider.<sup>1</sup>**

The exact identity of this variety is uncertain and its history is obscure. It appears to have been grown in Benton County, Ark., under this name for at least 60 or 70 years. The only use of this name, however, that has been made in American pomological literature is as a synonym of Smith Cider, a very different apple. It is stated that the variety in question is also known by some under the name *Pennsylvania Red-streak*. But this name is used by the standard authors on pomological subjects only as a synonym of Wine. As in the case of Smith Cider, Wine is a variety which could not well be confused with the one in question. A Pennsylvania origin for this variety is suggested by its name but thus far it has not been possible to trace it beyond north-western Arkansas, where it is occasionally found and where it has been grown in a few orchards for many years, as above indicated. It may be an old eastern variety, as the name would suggest, which was taken to Arkansas long ago, meanwhile becoming extinct in the East, or practically so, while it has been perpetuated to a limited extent in the Ozark region. Or it may be of local origin and named "Pennsylvania Cider" because of sentiment on the part of some one who became acquainted with it in its early days.

The tree is a fairly good grower, with no characteristics that are especially distinctive. In the few orchards in which it has been observed it is proving moderately productive.

<sup>1</sup> The variety listed as "Babcock No. 13" in *Nomenclature of the Apple*, Bulletin 56, Bureau of Plant Industry, 1905, is undoubtedly this variety. It appears that the use of Babcock No. 13 as an approved name is erroneous.

Rather high cultural conditions are evidently necessary for the fruit to develop uniformly, since if neglected many of the apples are small and inferior.

The fruit is medium to above in size; surface smooth, except for ribbing in some specimens; color yellow, washed with mixed red splashes and broken stripes of crimson, and covered with rather heavy bloom; flesh yellow, medium fine, breaking, moderately juicy, mild subacid; quality good to very good. As previously stated, this variety is popular with some, especially for home use; others do not regard it as of special importance. It apparently has sufficient merit to warrant more attention than has been given it in recent years.

**Ralls.** Synonyms: *Rawles Janet*, *Geniton*.

This variety is widely distributed throughout the Ozarks, and it is grown in considerable quantities. It is rarely found, however, in the younger orchards. The tree makes a moderately strong, spreading growth and is considered to be long lived as a rule. It is one of the latest varieties to blossom and on this account it sometimes escapes injury from late spring frosts and produces a crop of fruit when most other varieties fail. It often tends to overbear.

The fruit is commonly produced in bunches when the trees bear full, and it is often too small in size to be satisfactory for commercial purposes. It is also exceptionally subject to bitter-rot, apple scab, and other diseases. It is one of the latest varieties to mature and one of the long-keeping sorts. These characteristics would tend to make it a desirable variety, but on account of the defects noted it can not be recommended. It is only under favorable conditions, with high culture and very thorough spraying, that it can be expected to prove at all satisfactory.

**Red Astrachan.**

While grown at a considerable number of points in the Ozarks, this summer variety is not produced in large quantities. In fact at present it can hardly be considered a commercial variety in this region. The tree makes a good, strong growth and under favorable conditions may be expected to bear well, though it is somewhat inclined to alternate bearing. It does not come into bearing as early as many varieties do.

The fruit reaches good size, and when fully mature it is highly colored. It is too acid in flavor for dessert purposes but is desirable for cooking. Its season of maturity depends, of course, upon the section in which it is grown. In the southern part of the Ozarks it reaches marketable condition the latter part of June or early July. The growers in the Ozarks who have had experience with this variety are in general favorably impressed with it as a summer sort. In some of the other apple regions of the United States where summer apples are grown extensively it is an important variety, though possessing several objectionable characteristics.

**Red June.** Synonym: *North Carolina Red June*.

Of the summer apples grown in the Ozarks, this is probably one of the most popular varieties; there are but few early sorts that are more widely grown. It is produced commercially in this region to a limited extent.

The tree, though not a particularly strong grower, is generally healthy and thrifty. It begins bearing moderately young and may be expected to produce good crops with regularity under favorable conditions. The fruit is sometimes borne in clusters to some extent, which is an undesirable feature. Its rather small size is its most objectionable characteristic as a commercial apple, but its deep-red color and good quality usually cause it to sell for very satisfactory prices in Kansas City and other comparatively near-by markets. It begins ripening by the middle of June in the southern part of this region and by early July in the more northern sections. It is considered a very profitable variety by some of the Ozark growers.

**Rome Beauty.**

This variety is widely distributed throughout the Ozark region and occurs in many orchards, but it has rarely been planted in large numbers. The tree reaches fairly

good size, but the foliage is frequently rather weak and subject to leaf diseases, which often cause the leaves to fall prematurely. There are very few places in this region where its record for bearing is satisfactory. It may blossom well and the fruit set abundantly, but in many instances subsequent dropping occurs to such an extent that before the fruit reaches maturity it is nearly all on the ground. This seems to be due simply to a lack of adaptability to conditions, which results in a weak articulation of the stem with the fruit spur. Further, the fruit rarely develops to a satisfactory size, it does not color well, and its general finish is poor. The trees are also tardy in some instances in coming into bearing.

While the above indicates the behavior of this variety, as it has been observed throughout a large part of the Ozarks, there are exceptions which suggest that in some sections under high cultural conditions it may be of value. In the eastern portion of the Ozarks, where the elevation drops below 1,000 feet, it has been found in one or two instances where it was doing much better than in more elevated locations; also at points south of the Arkansas River it is more promising than it is farther north. There is some doubt, however, even in the sections where it appears to be fairly well adapted, whether it would prove of sufficient value for extensive planting. In some of the important apple-producing regions of the country it has become a prominent variety.

#### **Shackleford.**

The first tree of this variety is said to have been owned by Judge Shackleford, of Canton, Mo., though it is supposed to have originated in a collection of seedlings grown from seed planted by a Mr. Riley near Athens, Mo. The authenticity of the latter statement, however, has not been verified in the present connection.

It was awarded first prize in 1884 by the Illinois State Horticultural Society. It was introduced about the same time, or possibly a year or so later. It was then anticipated, apparently, that it would soon occupy a very prominent place in the apple interests of the country. Subsequent experience, however, demonstrated that it did not possess qualities requisite to that end. The tree bears early, but the dessert quality of the fruit is very poor. Moreover, in the Ozark region it must be handled as a fall variety and during the autumn numerous other more valuable sorts are available. It is therefore considered of no particular value for this region.

#### **Shannon.** Synonym: *Shannon Pippin*.

The origin of this variety is uncertain, but it has frequently been ascribed to Washington County, Ark. It has also been considered by some authorities as identical with Ohio Pippin, a variety of Ohio origin. On the other hand, this identity has been questioned by prominent pomologists.

In some notes left by the late Charles Downing there appear several references giving information which was supplied to him by some of his correspondents in Arkansas. One or two of these references are of particular interest in the present connection and in substance they are as follows:

Richard Thurston, of Van Buren, Ark., in January, 1878, wrote Mr. Downing: "I have been engaged in this section of Arkansas over 30 years in fruit growing and know about the Shannon Pippin. One Granville Shannon, some 35 years ago, bought of a tree peddler and planted at or near a small place in Washington County, Ark., called Evansville, quite a number of apple trees, and when they came into bearing several of the trees bore the apples which, in consequence of having lost the labels and name if any had been attached, took the name of Shannon Pippin."

Another one of Downing's correspondents, John B. Gill, Springfield, Ark., writing in 1884, confirms the above information and gives additional details. He states: "It [the Shannon apple] was brought to Boonsboro, this county, in 1833, by a Mr. Rector, from Indiana, along with a lot of other trees which he brought here for sale, I think from an Ohio nursery, and heeled in at Kidds Mill, 1 mile south of Boonsboro. The Shannon Pippin being small and scrubby, just as they are growing in my nursery

to-day, no one cared to buy them. The labels were finally lost from the trees and Mr. Granville Shannon bought the lot (only 20) at reduced prices and planted them 6 miles south of Boonsboro, where some of the trees at least are growing."

The source of Mr. Gill's information, he further states, was "one J. B. Russell, of Boonsboro, who had operated a nursery almost in sight of Kidds Mill since about the time the trees were brought there."

While the above statements do not necessarily construct a clear historical account of the Shannon apple, they at least suggest what appears to be a reasonable probability as to its origin, so far as it relates to the Ozark region. That the trees referred to above came originally from an Ohio nursery may not be capable of proof, yet these circumstances as recited offer a logical explanation of the manner in which a variety of Ohio origin may have reached Arkansas and there received another name, in case the identity of the Shannon and Ohio Pippin is established at any future time.

Apparently, the Shannon was formerly more popular in the Ozark region than it is at the present time. It does not appear, however, to have been planted very much in the Ozarks at any period, except in northwestern Arkansas. In that section it is in a good many of the older orchards. The tree is only moderately vigorous and rather spreading in form. It is said to be rather late in coming into bearing and quite uniformly shy, in the experience of most growers in the section referred to. In fact, this characteristic has doubtless been a large factor in eliminating it from the younger plantings.

The fruit is large; surface very smooth; yellow, occasionally faintly blushed with dull overcast of whitish blotches and streaks; stem very short, often fleshy; flesh yellow, rather coarse, juicy; flavor, mild subacid; quality good;<sup>1</sup> season fall and early winter, though it is often shipped from Arkansas with the late summer varieties before it is fully mature.

In addition to its shyness of bearing, the fruit frequently scabs badly and sometimes rots. On account of its short stem, the growth of the apples produces so much pressure against the limbs on which they are borne that many are forced off, thus causing serious dropping. Though it is said to bring good prices, often in excess of some of the other well-known market varieties, it has too many weak points to make it a profitable apple to grow in this region.

### **Shockley.**

This variety originated in Georgia and is one of the most widely grown sorts throughout the southern apple districts. It is common in the Arkansas and Oklahoma portions of the Ozarks but is seldom found in the Missouri orchards.

The tree is only moderately vigorous; it is upright in habit of growth with rather long, slender branches. There are few varieties that bear more regularly than this one does, though different parts of the tree often alternate, a portion of the limbs producing a heavy crop each season while very little fruit is borne on the remainder of the tree.

The fruit is usually below medium in size, unless very skillfully grown; rather pale yellow, overspread with light red; flesh rather crisp; flavor very mild subacid or nearly sweet; quality only good. It is one of the longest keeping varieties grown in the South. As observed in the Ozarks, however, it is one of the most susceptible of all varieties to cedar rust. The fruit is more often than otherwise severely attacked, while not infrequently a large part of the foliage is lost as early in the season as August as a result of this disease. The fruit is also very susceptible to bitter-rot and apple blotch. To grow the Shockley successfully therefore it must be sprayed with extreme thoroughness.

Its chief value in this region is probably for home use in those sections where cold-storage apples can not be readily obtained and where the supply of fresh fruit for

<sup>1</sup> A detailed description of this variety appears in the Report of the Department of Agriculture (Report of the Pomologist) for 1886, p. 269.

family use during the winter must be held in farm cellars or pits. This statement applies especially to the southern portion of the Ozarks, where the winter varieties of the more northern sections, when grown, lack good keeping qualities.

### **Smith Cider.**

This variety originated in Bucks County, Pa., more than a century ago. It has become widely distributed throughout the country, though in no section has it become of great importance. It is found in many orchards in the Ozark region at widely separated points.

The tree makes a satisfactory growth, though it is inclined to be somewhat scraggy; it may be said to be productive in comparison with other varieties of recognized commercial value. The fruit is medium to large, oblate conic, often somewhat lopsided, though very variable in form and in some other characteristics; color yellowish, striped and splashed with crimson; flesh white, satiny, subacid; quality only good; season late fall and early winter.

Though Smith Cider has some merit for this region, and has proved quite satisfactory and profitable in a few instances where it is grown in commercial quantities, it does not have positive characters sufficient to make it a leading variety. It might be termed "indifferently good" for Ozark conditions. It is only moderately attractive in appearance, only a little better than Ben Davis in quality; moreover, the fruit is sometimes badly attacked by apple blotch.

### **Springdale.**

This variety is another Arkansas seedling. About 1890 it attracted considerable attention in that State and it was predicted that it would eventually become an important sort. It has been more or less disseminated in different sections of the country but has failed to attain the prominence that was anticipated. It has attracted little attention in the Ozark orchards. Probably the fact that it is no better in any particular than a great many other well-known varieties and is inferior to numerous sorts, accounts in a measure for its lack of popularity. The tree makes a good, strong growth but is peculiarly susceptible to the attacks of a disease which produces characteristic knots or tumors on the trunk.<sup>1</sup> The fruit is of medium size or above; color yellow, washed with mixed red and marked with splashes and broken stripes of bright crimson; flesh yellowish, satiny, subacid; quality only good.

### **Stayman Winesap.**

This variety was produced by the late Dr. J. Stayman, of Leavenworth, Kans., from seed selected from a choice collection of Winesap apples. These seeds were planted in 1869.<sup>2</sup> During the past 12 or 15 years this variety has been widely disseminated in middle latitudes and to a considerable extent on the Pacific coast and throughout the Northwest. Few of the more recently introduced varieties are proving of as great value, both for home use and for commercial purposes, as is this one. In the Ozark region, however, it has been given comparatively little attention, probably on account of the fact that the period of rapid extension of apple culture in this region was largely past before it began to attract much attention from fruit growers.

Trees of Stayman Winesap have been found in the Ozark region in only a very small number of widely separated places. It therefore can not be said to have been tested sufficiently to determine its real value for Ozark conditions.

In one instance the tree appeared to be rather weak; in another case a tree 9 years old had not produced much fruit, though the small quantity it had borne was very pleasing to the owner. As the tree ordinarily is a good, strong grower, bears early,

<sup>1</sup> Apparently the disease described in Circular 3, entitled "Some Stem Tumors or Knots on Apple and Quince Trees," Bureau of Plant Industry, 1908.

<sup>2</sup> For further historical information and detailed description of this variety, see Yearbook of the U. S. Department of Agriculture for 1902, p. 470.

regularly, and abundantly, the faults noted here are not interpreted as necessarily signifying a lack of adaptability to Ozark conditions.

The fruit is medium to large, averaging considerably larger than Winesap; color yellow, washed with mixed red and marked with splashes and broken stripes of crimson; flesh yellowish, flavor subacid, rich; quality good to very good. The great value of this variety in many different sections of the country, representing a very wide range of conditions in environment, makes it appear probable that it would also be well adapted to the Ozark conditions. Apparently it can be grown with great satisfaction farther north and at higher elevations in the middle latitudes of the United States than the Winesap apple. The Stayman Winesap should be widely tested under Ozark conditions.

### **Summer Champion.**

A remarkably large number of apple varieties have originated in Washington County, Ark., and several of them have become of commercial importance. Summer Champion is one of its contributions. The original tree, now probably 25 years old and possibly older, stands on the farm of Mr. W. T. Waller, located 6 or 8 miles north or northwest of Lincoln. The name "Summer Champion" was applied to it by the owner. It has been grown more or less locally for a good many years, but it is only during the past 8 or 10 years that it has been widely advertised among fruit growers. It is not extensively grown in the Ozarks even at this time, though a small number of orchards contain it in commercial quantities.

The tree is a good, strong, stocky grower, making a rather upright open head. Apparently it bears well when conditions are favorable. The fruit is large; color yellowish white, washed over entire surface with crimson or dark purplish stripes; flesh whitish, satiny, subacid; quality good; season, in northwestern Arkansas, August. It will be noted that it does not rank high in quality; but it is beautifully colored when well matured, and it is regarded by some of the growers in Washington County as one of the best varieties of its season. It is doubtless worthy of careful trial throughout the Ozarks by those who are interested in growing summer apples.

### **Tull.**

Very little appears to be known about this variety. As nearly as its history can be traced, it originated about 1840 near Tull (post office), Grant Co., Ark., from seed planted by the late Abraham Tull. The section of Grant County in which Tull is located was formerly a part of Saline County. In the Ozarks this variety has been found at only a few points south of the Arkansas River (in localities near the place of origin) and in one orchard in southern Missouri. In the former section it is considerably prized as one of the comparatively few good keeping varieties that does well and bears regularly in the long growing seasons which characterize that part of the Ozark region. In southern Missouri trees 10 to 12 years old have not borne very much fruit.

The tree is remarkably thrifty and free from disease. The fruit is of medium size; color yellow, washed with red, a few broken stripes of crimson, sometimes more or less overspread with a "coppery" finish; flesh yellow with green veins; texture fine, tender, juicy; flavor subacid, pleasant; quality good to very good. As above indicated, its season is winter. As far as observed it seems to be largely free from attacks of apple scab, bitter-rot, and other diseases.

While the merits of this variety for planting widely in the Ozarks are largely unknown, present indications point to its probable value, especially for the southern sections having relatively low altitudes.

### **Wealthy.**

It seems rather remarkable that a variety of apple which has been as widely distributed for many years as the Wealthy should not have been planted more commonly

in the Ozarks. As a matter of fact it is in only a very few orchards in this region; these are largely in the southern and in the western or Oklahoma portions. It originated in Minnesota about 50 years ago from seed which is said to have been obtained in Maine.

The trees observed have nearly all been in rather neglected orchards and under these conditions they have been making a rather weak growth. It is not as vigorous as many varieties, even under good cultural methods, and the leaves are characteristically small, often giving the appearance of being somewhat scanty. In some places, especially south of the Arkansas River, the trees have blighted badly. The fruit is medium to large in size unless the trees are very heavily loaded, when it is small; color yellowish white, washed with mixed red or heavily striped and splashed with red when well colored; flesh yellowish white, sometimes tinted red, tender; flavor subacid, sprightly; quality good to very good; season in the southern Ozarks, early August. Probably its time of ripening accounts partially for its not having been planted more extensively in this region in the earlier years. Many apples are now shipped from this region during August in favorable seasons; and with the increasing demand for summer apples it would seem that the Wealthy is worthy of more consideration than has been given to it heretofore. It bears early; this characteristic, together with its rather small growth of tree, renders it a suitable variety to use as a "filler" where the filler system of planting is desired.

**White Pearmain.** Synonym: *White Winter Pearmain*.

This variety is widely grown throughout the middle latitudes and on the Pacific coast. It is quite widely distributed in the Ozark region. While its importance is only secondary, in comparison with the leading commercial varieties, it is produced in considerable quantities in a few orchards.

The tree makes a rather upright, moderate growth. Its bearing proclivities have been very irregular in this region. In some orchards it tends to overbear and the fruit is undersized, while in others it is reported to bear light crops habitually. This difference in bearing is not readily explained. The fruit is commonly borne in clusters, which necessitates thinning for the best results.

It is of medium size; color pale yellow, commonly with a tinge of red on exposed side; flesh yellowish, flavor subacid, quality good to very good; season winter.

The White Pearmain is much subject to apple scab and frequently is badly attacked by apple blotch and bitter-rot, unless very carefully sprayed. On the other hand, its high dessert quality and other desirable characteristics, especially in the experience of some of the Ozark growers, make it of some value in this region. On account of the special attention required to develop it to a high degree of perfection, however, it is a variety for the expert and the specialist rather than for the general grower.

**White Pippin.**

Though this variety is widely distributed in many parts of the country, from Maine to the Pacific coast and as far south at least as northwestern Arkansas, it is not produced in important commercial quantities in any section. So far as the fruit indicates, it appears to be one of those "strongly fixed" varieties which do not vary greatly in appearance even when grown under widely different conditions. The fruit is large in size; greenish white to pale yellow when fully ripe, often with pale-crimson blush on exposed side; flesh yellowish white, subacid, rich; quality very good; season winter.

This variety is of so slight importance in the Ozarks at this time that reference to it in the present connection would be unwarranted were it not for the purpose of calling attention to its possible value. The excellent specimens produced under typical Ozark conditions, together with its wide range of adaptability, suggest that it might be made an important variety in this region, especially where high dessert

quality is desired. It should be added that its bearing proclivities have not yet been sufficiently well demonstrated in this region to assure it in this particular. It should therefore be planted cautiously for the present. The fruit is sometimes mistaken for the Yellow Newtown (*Albemarle Pippin*) apple.

**Willow.** Synonym: *Willowtwig*.

This variety is grown in many widely separated regions of the country. In some of them it has assumed considerable commercial importance. It occurs in many orchards throughout the Ozark region. Though not a leading variety, it is grown in sufficient quantity to be included among the commercial apples of the region.

The tree makes a strong, spreading growth with rather slender, somewhat drooping, willowy branches; hence the synonym *Willowtwig*, by which it is much more commonly known than by its approved name. Under favorable conditions it apparently may be expected to produce abundant crops. The apple is medium to large in size; color yellowish green, washed and striped with dull red; flesh yellowish, flavor mild subacid, quality good; season winter.

Many of the Ozark growers have found this variety especially subject to bitter-rot, and they object to it on this account. In some cases it has been harvested early in September to avoid loss from that disease. However, it is not sufficiently mature for harvesting as early as that, and the color, which at best is apt to be somewhat deficient, is usually very poor at that period. With these defects, therefore, the Willow is not a variety that can be recommended for this region without reservations, though in some cases it has been observed to reach a high degree of perfection for the variety. There are, moreover, some rather strong indications that it is less well adapted to the portion of this region that is south of the Missouri-Arkansas line than it is to southern Missouri.

**Wilson June.**

This is another one of the many varieties which originated in northwestern Arkansas. The history of the original tree traces back to a period shortly preceding the Civil War and to the Earles Holt nursery, which was located at or near Canehill, Washington Co., Ark. Earles Holt died just prior to the war, and during the war period the nursery existed in what was practically an abandoned condition. Following the close of the war this nursery was cleared up and many of the trees sold. In the spring of 1865 about 1,000 of them were planted by Albert Wilson, then a boy 17 or 18 years of age, and a younger brother, A. J. Wilson, on their father's farm, the "William Wilson" place, located 6 or 7 miles north or slightly northeast of Lincoln, Ark. This farm is still operated by Mr. Albert Wilson, by whom the early history of this variety was supplied in conversation with one of the writers.

These trees were all several years old when planted, as they had been in the nursery since prior to the Civil War. Many of them bore fruit the next year after they were planted on the Wilson place. In 1866 or 1867 one tree in particular attracted special attention. It was the only one of its kind in the orchard. It was about this time that David Moore started a nursery near Lincoln, and he obtained scions of this particular tree, which he propagated. He then named the variety "Wilson June," the apple now under consideration.

To what extent Mr. Moore propagated this variety does not appear. Apparently, however, it was only in a limited way, as it seems to have remained largely unknown even locally until about 1894 or 1895 when it was evidently "rediscovered" on the "Doufit place," about half a mile north of Lincoln, where it then existed as a bearing tree (or trees). At this period Mr. W. M. Norwood began propagating it in his nursery, located 6 or 7 miles northwest of Lincoln. Since he began its dissemination, the variety has locally become quite commonly known, but the "Doufit place" is generally mentioned as the locality of its origin.

More recently it has become widely advertised, but unfortunately it has been confused with another variety, the San Jacinto. Though these two varieties are quite similar in external appearance, the latter is subacid in flavor while Wilson June is sweet when fully ripe.

Just what the source of the original tree was can not now be determined beyond the statement, which appears to be authentic, that it came from the Earles Holt nursery, where it was started prior to the Civil War. It may have been a seedling stock that was grafted and the scion failed to grow or possibly a seedling grown for use as a stock but which was never grafted. That it was of seedling origin in this nursery appears certain beyond reasonable doubt. The characteristics of the fruit strongly suggest that it was of Red June parentage.

The Wilson June tree makes a moderately strong growth, apparently comes into bearing fairly early, and seems to have good bearing proclivities. The fruit is medium to large in size; color yellowish, covered over the entire surface with dark crimson, sometimes indistinct, stripes; flesh yellowish or yellowish white; flavor sweet when fully ripe; quality good to very good; season last of July and early August in north-western Arkansas.

The very attractive appearance and other desirable qualities of this variety commend it rather highly as a summer variety for this region. It is reported to bring good prices on the Kansas City market. Its sweet flavor, however, may make it less generally popular than if its flavor were a mild subacid.

#### **Winesap.**

Among the commercial varieties grown in the United States, this one holds a prominent position. Its place of origin is unknown, though it is commonly conceded to have come from New Jersey. The first published description of it appeared in 1817—nearly a century ago. It is widely and quite extensively grown throughout the Ozarks, but with varying degrees of success. In fact, its "performance record" has been such as to make it exceedingly difficult to give a fair and accurate estimate of its real value and adaptability to Ozark conditions. The following discussion may suggest certain general principles which underlie the modification of fruit varieties by environment and their adaptability to different conditions.

The Winesap tree is rather distinctive in manner of growth, the dark green color of the bark and foliage and the drooping limbs being quite characteristic. It makes only a moderately strong growth in this region; the foliage is rather susceptible to diseases of various kinds and twig-blight is not uncommon, though it is rarely very serious.

The fruit is commonly rated as medium in size. Particularly well-grown specimens may be large, though much of the Ozark fruit of this variety is small in size. Its color is yellow, covered nearly entirely with crimson, and marked with a few broken purplish stripes; flesh yellowish or yellowish white; flavor subacid, rich; quality good to very good, being only "good" when poorly grown; season winter.

There appear to be rather well-defined degrees of adaptability of the Winesap apple within the limits of the region under consideration. For the greater part of the Missouri portion and for the part in Arkansas which is north of the Boston Mountains, little can be said in its favor as a commercial apple, at least when grown under the usual cultural methods that largely prevail in these portions of the Ozarks. It is to be found, however, in a very considerable proportion of the orchards.

A general summary of the observations made in regard to it during a period which extends over several seasons may be expressed as follows: Quite inclined to be unproductive, especially in the portions of Missouri and Arkansas above designated; sometimes sets good crops of fruit which nearly all drops; in some cases it holds a full crop, usually of inferior fruit under ordinary cultural conditions; fruit apt to be small and exceedingly scabby; often poorly colored and inferior in every way. Some

seasons the general behavior is more favorable. For instance, field notes for the season of 1906 frequently contain the comment "better this year than usual." Certain other exceptions have also been noted, but in most cases these are in orchards which had received much better care and more thorough spraying than the average. Doubtless, however, its behavior in the "average" orchard is a manifestation of the inherent characteristics of the variety.

In this connection it is of interest to note that south of the Boston Mountains, in the valley of the Arkansas River, where the elevation is relatively low, and continuing to the southern limits of the Ozark region the defects noted above become much less marked. In fact, by some growers in this portion of the region, apparently not without good reason, it is considered one of the best winter varieties they have. On the eastern border of the Ozarks, in southern Missouri, where the elevation drops to about 1,000 feet and below, its behavior is similar to that south of the Boston Mountains, where, in the immediate valley of the Arkansas River, the elevation is only about 500 feet.

It has been repeatedly noted that the fruit of this variety grown at less than 1,000 feet elevation on the eastern border of the Ozarks, in southern Missouri, is strikingly similar in its minute characteristics to typical specimens of this variety as it develops in the Piedmont region of southern Virginia at an elevation of about 1,000 feet, where it attains a high degree of perfection.

Furthermore, its behavior in southwestern Missouri and northwestern Arkansas, as already described, is strikingly similar to its behavior in some of the mountain orchards of Virginia, the elevation of which is considerably above that of the Piedmont region. The similarity of behavior in these two regions is still further brought out in the way it responds to high cultural conditions and thorough spraying. In certain Virginia orchards which are located on sites considerably exceeding 1,000 feet in elevation, where unproductiveness and extreme susceptibility to apple scab were formerly dominant characteristics, it has been made of value by applying better cultural methods and especially by proper attention to spraying. This has also been the experience of some of the Ozark growers.

A most interesting correlation of the Winesap apple in its behavior in the Ozark region and in certain portions of the Piedmont and Blue Ridge regions in Virginia is thus indicated.<sup>1</sup>

Summarizing the foregoing discussion, it may be stated that in that portion of the Ozarks north of the Boston Mountains which has an elevation much exceeding 1,000 feet the Winesap apple in the average season may be expected to produce only light crops of fruit, which is usually of low grade on account of scab, small size, and inferior finish—except when thoroughly and properly sprayed and under high cultural conditions. At 1,000 feet elevation and less in southern Missouri and south of the Boston Mountains in Arkansas it appears to be a desirable variety and well adapted to the conditions in those sections. While some of the elevations south of the Arkansas River considerably exceed 1,000 feet, the unfavorable influence of the higher elevations is largely equalized by the more southern latitude of this section.

#### **Yellow Bellflower.**

This variety is considerably grown throughout the older apple-producing sections of the North as far west as Michigan, and it is a prominent sort at some points on the Pacific coast, especially in California. It is also more or less widely distributed in other regions, and assumes as much importance in the Ozarks, perhaps, as in any section outside of those designated above. In the Ozark region it forms a secondary variety in many orchards, especially in southern Missouri and in Arkansas north of the

<sup>1</sup> For a rather full discussion of the behavior of the Winesap apple in Virginia, see "Orchard Fruits in the Piedmont and Blue Ridge Region of Virginia and the South Atlantic States," Bulletin 135, Bureau of Plant Industry, 1908, p. 45.

Arkansas River. The tree makes a strong, healthy growth and is not especially subject to disease. The fruit when grown under conditions to which it is well adapted is large, oblong; color yellow, often with blush; flesh yellowish white, tender, crisp; flavor sprightly subacid, aromatic; quality when grown in sections where it is well adapted very good; season winter in the North, but here it is harvested and marketed for immediate use during the last of August and early September. On the Pacific coast it is marketed as soon as it is picked, to some extent for immediate use, but it is also stored for early winter markets.

As grown in the Ozarks, however, the color is usually a pale lemon yellow and the flavor, which is distinctly characteristic in some sections to which the variety is especially well adapted, loses its sprightliness and aromatic qualities and becomes a sharp acid without much distinctive varietal flavor. While it has been quite productive and is considered profitable in a few instances, it produces light crops as a rule and has little to commend it for planting in this region. Both tree and fruit are usually quite free from disease, and in some regions of the country the tree has been found a desirable one to use as a stock for top-working.

**Yellow Newtown.** Synonym: *Albemarle Pippin*.

This variety, which is especially prominent in certain districts on the Pacific coast and in Virginia in particular locations, occurs in a very few orchards in northwestern Arkansas. It calls for only a brief mention in the present connection. The exacting requirements of this variety in order for it to develop to a high degree of perfection are well known. From such evidence as is available it is apparent that they are not afforded in the Ozark region to a sufficient extent to warrant the planting of it. While the few trees of this variety which have been observed are in a fairly good condition, have made a moderately good growth, and apparently bear considerable fruit in some seasons, it has poor keeping qualities, is small, subject to bitter-rot and other diseases, and does not reach that perfection of "finish" which is particularly essential in this variety.

**Yellow Transparent.**

Since this variety was introduced from Russia in 1870 by the Department of Agriculture it has become very widely distributed and is now grown more or less in a large proportion of the apple-producing regions of the country. Aside from being a variety which reaches a fairly high degree of perfection under a very wide range of conditions and being of moderately good quality both for cooking and for dessert purposes, its strongest point of popularity doubtless rests upon its earliness of maturity. In fact, were it not for its early date of maturity it is doubtful if it would ever have become generally popular on account of the susceptibility of the tree to blight and the weak growth which it makes except under very favorable conditions. Its season of "market-ripe" condition is the earliest of any widely grown variety, and local sorts are produced which ripen earlier in only a comparatively few sections.

Summer apples do not constitute an important part of the Ozark apple industry at present, and comparatively few growers have the Yellow Transparent in their orchards, though it perhaps occurs as frequently as any other early variety. In a few instances quite heavy plantings have been made.

The tree comes into bearing very early, and for this reason it is often used as a filler between permanent trees. Normally it bears regular and prolific crops. The fruit is medium or above in size; color, beautiful clear yellowish white, often assuming a waxy appearance; subacid; good to very good. Its season in the Ozarks is the middle to the last of June or early July, depending upon the section in which it is grown.

As already stated, the tree generally makes a rather weak growth. This is usual also under Ozark conditions. While in some seasons in this region but very little blight occurs it is very serious other years, destroying not only the twigs but the fruit spurs and even the larger branches in some cases. If it were not for blight this

variety could doubtless be made very profitable in this region under favorable conditions, as the fruit reaches a high degree of perfection: but it is a question if that disease is not too serious a menace to warrant extensive plantings.

**York Imperial.** Synonym: *Johnson's Fine Winter*.

The origin of this variety traces to York County, Pa. In the course of the development of the apple industry it has become of commercial importance in many sections throughout the country, including the Ozark region. While it is not one of those



FIG. 6.—A tree of the York Imperial apple in northwestern Arkansas, 7 years of age. This tree was selected by the man in charge of the orchard as approximating his ideal for a tree of this variety. The top, however, should be thinned out. A tree of this type is formed by leaving a central "leader" when it is pruned at time of planting and forming the head from the large number of relatively small branches which radiate from the leader. (Compare Pl. V, fig. 2.)

varieties which custom has placed in practically every orchard, at the same time it is in a great many of them. Most of the larger orchards contain it.

The tree makes a good strong growth and is ordinarily quite free from disease, except blight. It is one of the most susceptible to this disease of all the varieties commonly grown in this region. However, rarely more than the twigs of the current season's growth are involved, and the lives of the affected trees are therefore not greatly endangered; but the blighted twigs may be more or less of a menace to other trees in the same vicinity, since they constitute a source of contagion from which the disease may spread. Figure 6 shows a young York Imperial tree.

The fruit when well grown is large in size; color yellow, washed with mixed red, nearly the entire surface being covered in well-colored specimens with a suggestion of striping and overspread of gray; flesh yellow, subacid, good; season winter. As a winter sort, however, it is made less valuable than it would otherwise be by its marked susceptibility to "scald" when in storage. For this reason it is not a satisfactory cold-storage apple. The danger of scald is reduced to a minimum, however, when the fruit is well matured and highly colored at time of picking and is then stored promptly. The quicker the fruit can be cooled after picking to the usual storage temperature for apples the better all varieties will keep, other things being equal.

The value of this variety for Ozark conditions is open to some question. Though it produces good crops of attractive and well-finished apples in some seasons it does not appear to be entirely adapted to this region, at least under the prevailing cultural methods. The trees sometimes set very full of fruit, and thinning is necessary in order to develop to sufficient size; there is some tendency for the fruit to drop unduly; and though the color is fairly good in a favorable season, it is not as high, as a rule, as it is in some other regions where this variety is extensively grown. Moreover, the apples are apt to be very uneven in size, even on the same tree, many being so small that they must be culled out in packing. While this is a common tendency in most regions, it appears to be somewhat intensified in many instances in the Ozark region. This variety, however, probably has greater possibilities for Ozark conditions than has heretofore been realized for it in most of the orchards which contain it. In order to realize these possibilities it should not be allowed to overbear. It should be sprayed systematically with a view to the influence which proper spraying has to prevent the dropping of the fruit; and in many cases better cultural methods aside from spraying are doubtless essential to the production of best results.

#### IMPORTANT VARIETIES OF PEACHES.

Among the tree fruits grown in the Ozark region the peach holds a place which is second in importance compared with the apple. The census figures given in Table I (p. 7) show the relative importance of these fruits, at least numerically, as they existed in the census years of 1890, 1900, and 1910. While there is a marked concentration of the peach industry at certain points, of which the Koshkonong district in Oregon County, Mo., and the Van Buren-Fort Smith district in Arkansas are notable examples, there is hardly a section in the entire Ozark region where commercial fruit interests have been developed in which they are not grown to some extent. In sections where strawberries are an important commercial fruit they are commonly used as an interplanted crop in young peach orchards, as shown in Plate V, figure 2.

In some respects the variety problem in growing peaches is even greater than it is with apples. In general, it is probably true that most of the well-known peach varieties have a wider range of adaptability than the majority of apple varieties. Though the adaptability factor must be carefully considered, yet the most serious problem in choosing varieties to plant is often more largely in connection with selecting those that mature at particular times than it is in selecting those which reach a good degree of perfection in

any region that may be under consideration. The exact time at which a variety will ripen in a given region frequently determines primarily whether it can be grown profitably there. For instance, in case of the Elberta peach the problem in the further planting of it is not to find localities or regions in which it does well, but rather to select suitable sections for peach culture in which it will ripen at a period when the markets are not already stocked with fruit from other regions.

Again, in the case of the peach specialist who desires to have fruit ripening continuously throughout the "peach season," from early to late, it becomes a critical matter and one of great importance in many ways to select varieties which ripen at such times that he will have no break in the continuity of his harvest. A break in the sequence of ripening may result in more fruit than he can handle with his regular crews at certain times and not enough work to keep them profitably engaged at other periods.

In connection with these investigations 70 or more different varieties of peaches have been reported. Many of these are grown in perhaps but a single orchard, while scarcely a dozen sorts are really of commercial importance in this region. Among the varieties that are produced in considerable quantities the Elberta is relatively of so much greater importance than any of the others that it may almost be said to constitute the peach industry of the Ozarks.

While many of the earlier varieties reach a good degree of perfection in favorable seasons, the prices received for them are not sufficient, as a rule, to render their culture regularly profitable, except to the extent that they may be demanded for local and near-by markets. Prior to the Elberta season in the Ozarks the markets are usually supplied with peaches (largely the Elberta) from other regions in which they ripen earlier than they do here.

By the time the Elberta season is reached in the Ozarks, however, fruit from the earlier ripening districts has largely passed out of the markets, thus making a good demand for the Ozark-grown Elbertas.

The following brief notes regarding the more important sorts will serve to indicate the principal characteristics in their adaptability to this region and their relative value under Ozark conditions.<sup>1</sup> As the Elberta is by far the most important peach variety grown in the Ozark region, the ripening periods of many of the other sorts named in the discussion are given with reference to that variety. (See "Elberta," p. 60.)

An abbreviated description of the varieties discussed is given in Table V (p. 64).

<sup>1</sup> For dates of ripening of the varieties referred to in the following discussion, for which the season is not mentioned, see the respective varietal names in Table VIII (pp. 80 to 86), columns headed "Date first picking" and "Date last picking."

**Alexander.**

This variety is grown in the Ozark region to a very limited extent, especially at southern points, where it ripens early in June. Its chief value is its earliness. As it does not ship well and is much subject to brown-rot, its usefulness is largely for home consumption; and even for this purpose it can not prove very popular, on account of its inferior dessert quality.

**Belle.** Synonym: *Belle of Georgia*.

Though this variety is a leading one in the Georgia orchards and is quite widely grown in other sections, it is rarely found in the Ozark region. The few growers who have it in their orchards speak with favor concerning it. In season it slightly precedes the Elberta. At elevations of 1,200 to 1,300 feet in northwestern Arkansas it ripens during the latter part of July.

**Carman.**

During the past few years this variety has been widely disseminated. As a "second early" sort it is generally giving a good degree of satisfaction, though in some instances it is reported to rot rather badly. This, in general, has been its behavior in the few orchards in this region in which it has been found. At elevations of 1,200 to 1,300 feet in southern Missouri it ripens about the middle of July.

**Champion.**

This variety is widely grown in many of the northern peach districts, where it is of much value both for home use and for distant markets. It is in quite a good many of the orchards in southern Missouri and a few of the Arkansas orchards. It reaches a high degree of perfection, so far as size, color, etc., are concerned, and is considered of value for local use; but in the experience of a large proportion of the growers who have it the fruit lacks firmness, being too tender to be satisfactory for shipping to distant markets. In this respect there is a marked difference between its behavior in the Ozarks and in the northern districts where it is grown. Apparently its southern limit of adaptability is approached in the latitude of the Ozarks and exceeded so far as important commercial purposes are concerned. Its season is approximately the same as Belle, slightly preceding Elberta. As Belle is a variety of southern origin, while Champion originated in Illinois, it appears probable that the Belle could be satisfactorily substituted in this region for the Champion.

**Chinese Cling.**

So far as its relative commercial importance is concerned, this variety occupies much the same place in this region that the Champion does. It occurs in a good many orchards, but relatively in very small proportions. The fruit is of good size and has many desirable characteristics, but the experience of most growers in this region shows that it is subject to brown-rot to a serious degree. Its ripening period corresponds quite closely with Elberta, though in some cases it is a few days in advance of that variety.

**Early Crawford.**

This variety, which has long been a popular sort in many sections of the country, is to be found in this region in only a few orchards, and these are located in widely separated sections. Its general behavior, so far as observed, is rather favorable. The fruit is sometimes inclined to be small, and it has not been as productive in all cases as is desirable. On the other hand, it attains good color and quality and has been less subject to brown-rot than many other sorts. Its season precedes Elberta by a few days.

**Elberta.**

This is by far the most important peach variety grown in the Ozark region. Concerning its relative importance in southern Missouri, Mr. Paul Evans, Director of the

Missouri State Fruit Experiment Station, states:<sup>1</sup> "In the consideration of commercial varieties, however, we really have but one, the Elberta, and varieties maturing earlier than it are not profitable, except perhaps for small local trade. The Elberta comes more nearly fulfilling all the requirements of a commercial peach than any other variety grown in south Missouri."

In general the above statement applies to the entire Ozark region, as well as to that portion of it referred to in the quotation. It is a question if the above comment relative to the unprofitableness of varieties that ripen earlier than Elberta does not also apply to most of those which are considerably later, though perhaps not for the same reason.

A view of an Elberta peach orchard which has been well cared for, near Van Buren, Ark., is shown in Plate VI.

No extended account of this variety is necessary in the present consideration. Its importance in this region has already been indicated. This suggests in a general way the relatively high degree of perfection which it reaches under favorable conditions. The statements apply to the entire region, though there are doubtless sectional differences in the behavior of the variety which might be noted. Some seasons, especially if there is much rain during the later period of its growth or during the ripening period, heavy losses may occur from brown-rot. The buds are also rather tender and subject to injury by relatively slight extremes of temperature. But these are not regional peculiarities; they are inherent characteristics of the variety. The excellent shipping qualities of the Elberta, which have contributed largely to its great value for commercial purposes in other regions, are usually possessed in a good measure by the Ozark-grown fruit. Moreover, the ripening periods in the different sections of this region are in good sequence with one another and with other regions for the advantageous marketing of the fruit.

Because of the importance of exact ripening periods of this variety in different sections, the dates of first picking in different years at various places in the Ozarks are given in Table IV.

TABLE IV.—*Dates of first picking of the Elberta peach in different years at different places in the Ozark region.*

Place.	Approximate latitude.	Approximate elevation.	1904	1905	1906	1907	1908	1909
ARKANSAS.								
	° /	<i>Feet.</i>						
Magnolia.....	33 15	320	.....	.....	July 10	July 12	July 1	.....
Horatio.....	33 55	400	.....	July 15	July 13	July 11	July 5	.....
Corinth.....	34 5	655	.....	.....	.....	July 15	do.	.....
Grannis.....	34 15	921	.....	.....	.....	July 13	July 7	.....
Cove.....	34 25	1,300	.....	.....	.....	do.	July 10	.....
Hot Springs.....	34 30	550	.....	.....	.....	.....	do.	July 10
Mena.....	34 35	1,350	July 20	.....	July 26	July 20	.....	.....
Hackett.....	35 10	900	.....	.....	July 20	July 15	July 3	.....
Russellville.....	35 20	1,000	.....	.....	.....	July 25	July 13	July 15
Van Buren.....	35 25	450	July 25	July 20	July 16	July 12	July 15	July 19
Clarksville.....	35 25	450	.....	.....	July 23	July 15	July 10	Do.
Ozark.....	35 30	1,100	July 25	.....	do.	July 23	July 12	July 20
Rudy.....	35 30	800	.....	.....	July 20	July 15	July 15	Do.
Mountainburg.....	35 40	1,500	.....	.....	.....	.....	July 20	July 25
Chester.....	35 40	1,900	.....	.....	.....	July 26	July 21	July 29
Leslie.....	35 50	1,600	.....	.....	.....	Aug. 3	July 24	.....
Springdale.....	36 10	1,400	.....	.....	Aug. 1	July 22	July 20	.....
Capps.....	36 15	1,440	.....	.....	Aug. 6	July 29	July 16	.....
Eureka Springs.....	36 20	1,500	.....	.....	.....	July 28	do.	.....
MISSOURI.								
Seligman.....	36 35	1,650	.....	.....	Aug. 6	.....	July 27	.....
Koshkonong.....	36 35	911	Aug. 1	.....	July 30	July 28	July 18	.....
Olden.....	36 50	1,250	Aug. 15	.....	Aug. 7	.....	July 30	.....
Willow Springs.....	37 0	1,247	.....	.....	Aug. 8	.....	Aug. 3	.....
Cedar Gap.....	37 5	1,690	.....	Aug. 6	do.	.....	do.	.....

<sup>1</sup> Peach Industry in South Missouri. Bulletin 12, Missouri State Fruit Experiment Station, 1904, p. 10.

In compiling the above data it was not possible to take into consideration the condition of the various orchards to which they apply. On this account they may not be strictly comparable. At the same time they will perhaps serve a useful purpose, especially as the ripening season of other varieties discussed in the present connection is given in most cases with reference to the Elberta.

The ripening period of this variety in this region also adds to its importance in its relation to the crop in other peach-growing regions. The reason for this exists largely in the fact that in most of the important peach-growing districts, in middle latitudes, in the South, and as far west at least as Colorado (including that State), the Elberta is the leading commercial variety. Its ripening period in the Ozarks occurs, as a rule, when the markets are not oversupplied with peaches from other districts, thus usually insuring good prices. The liberal supplies of Elberta peaches which ordinarily reach the markets from regions where they ripen earlier than in the Ozarks accounts in a large measure for the fact that in this region varieties ripening earlier are less likely to bring satisfactory prices than Elberta.

#### **Emma.**

This variety is grown but little in this region. It is much like the Elberta, but about 10 days later. While it is looked upon by some growers as a promising sort for a good market peach to follow the Elberta and is considered very desirable, others report that the buds are very tender and that it does not bear well. In one instance a considerable number of trees in one of the large orchards in southern Missouri were pulled out because they were unprofitable. As these unfavorable impressions were gained from orchards in locations where typical Ozark conditions prevail, it is apparent that this variety should be planted cautiously, if at all, or only experimentally.

#### **Family Favorite.**

Of the varieties which ripen prior to the Elberta, this one is relatively of considerable importance. It is contained in a good many orchards, and in some of the larger ones quite heavy plantings of it have been made. It is a white-fleshed peach with fairly firm texture and usually ships well. As a rule it seems to be less subject to brown-rot than many other early and second-early varieties. There are usually four or five days between the last shipments of this variety and the first picking of Elberta. While not always profitable, it has proved satisfactory in many cases.

#### **Heath.** Synonyms: *Heath Cling*, *White Heath*.

This variety is one of the most widely planted of the late-ripening sorts. It is grown more or less in most of the peach districts throughout the country. It is not of much importance, however, in the peach industry of the Ozarks, being in only a comparatively few orchards. For a variety ripening four to five weeks after Elberta, it is probably as satisfactory as any for this region. It seems to be rather less subject to peach scab than many of the late sorts.

#### **Late Crawford.**

This variety is not an uncommon one in the Ozarks, though it has not been planted extensively. It is frequently reported to bear light crops in this region, and the fruit is often small. It is about a week later than the Elberta.

#### **Mountain Rose.**

As a variety to precede the Elberta, in season of ripening, the Mountain Rose is favorably regarded by many of the Ozark growers. It is well adapted to Ozark conditions, reaching a good degree of perfection in favorable seasons. Its high dessert quality commends it for home use. To the extent that a peach having the season of Mountain Rose is desired by commercial growers, it is doubtless worthy of consideration.

**Oldmixon Free.**

The high quality of this variety makes it particularly acceptable for home use where a white-fleshed peach is desired which ripens about with the Elberta. In some seasons it ripens a few days in advance of that variety. Comparatively few of the Ozark orchards contain it, though some of the growers report it as profitable, especially for local markets.

**Picquet.** Synonym: *Picquet's Late*.

The Picquet is grown more or less in the Ozark region where a late variety is desired. In season it is about with Smock, ripening some three or four weeks after Elberta, that is, about September 1 in southwestern Missouri and northwestern Arkansas. Though it may set a good crop of fruit, it rarely matures well on account of its susceptibility to peach scab. In fact, in the experience of some growers, peach scab has rendered the successful growing of this variety practically impossible. The methods of controlling that disease, however, by the use of certain spray mixtures which have been developed during the past few years may in the future make possible the successful culture of valuable varieties that are extremely susceptible to this disease where heretofore it has been impracticable to grow them.<sup>1</sup>

**Salway.**

This is probably the most extensively planted late variety in the Ozark region. It ripens usually a few days after Smock and Picquet. While its inherent bearing proclivities have doubtless been all that could be desired, its extreme susceptibility to peach scab has frequently greatly damaged or even destroyed the marketability of the crop. Peach scab is a more serious factor with this variety than with even the Picquet, because Salway is much more extensively planted. Were it not for this disease the Salway would apparently be a profitable sort to grow, at least in some portions of this region.<sup>2</sup>

**Slaphey.**

This variety is regarded by a small number of growers in the Arkansas Valley as a desirable one immediately to precede the Elberta. In the Van Buren section it reaches a good degree of perfection. In appearance it is commonly described as an "early" Elberta, but it is considered by many to be better in dessert quality than the Elberta. It has been observed in the present connection only in the section of the Ozarks mentioned above; hence its desirability for other portions of this region is not definitely known.

**Smock.**

This variety is in a few of the larger orchards in the Ozarks, but it is of only minor importance. In a general way, the comments under Picquet apply to this variety, though it is probably not as susceptible to peach scab as that variety is. It ripens about with Picquet.

<sup>1</sup> The Control of Peach Brown-Rot and Scab, Bulletin 174, Bureau of Plant Industry, 1910; Spraying Peaches for the Control of Peach Brown-Rot, Scab, and Curculio. Farmers' Bulletin 440, U. S. Dept. of Agriculture, 1911.

<sup>2</sup> See comments under "Picquet" (supra) relative to peach scab.

TABLE V.—*Abbreviated description of important peach varieties.*

[KEY TO ABBREVIATIONS.—*Size*: l, large; m, medium; s, small; v, very. *Color*: b, blushed; c, creamy; g, green; r, red; w, white; y, yellow; s, stained. *Adhesion*: c, cling; f, free; sc, semicling. *Quality*: g, good; p, poor; v, very. A combination of abbreviations is used when it is necessary in order to express properly the characteristics of a variety.]

Variety.	Size.	Color.	Color of flesh.	Adhesion.	Quality.
Alexander.....	m	gw	gws	sc	p
Belle ( <i>Belle of Georgia</i> ).....	ml	cwb	w	f	g to vg
Carman.....	l	cw	ws	sc	g
Champion.....	ml	gw	w	f	g to vg
Chinese Cling.....	l	cwr	w	c	g to vg
Early Crawford.....	l	yb	ys	f	vg
Elberta.....	l to vl	yb	y	f	g
Emma.....	l	yb	y	f	g
Family Favorite.....	m to l	gw	ws	f to sc	g
Gold Dust.....	m	y	y	c	vg
Greensboro.....	m to l	gw	ws	c	g
Heath ( <i>Heath Cling</i> ).....	l	wr	gw	c	vg
Late Crawford.....	l	yb	y	f	vg
Lee.....	l	gy	ws	c	g to vg
Lemon Cling.....	m to l	yr	ys	c	vg
Mathews.....	l	y	y	f	vg
Mountain Rose.....	m	wr	ws	f	vg
Oldmixon Free.....	m to l	cwr	gw	f	vg
Picquet.....	l	yb	y	f	vg
Reeves.....	m to l	yr	ry	f	vg
Salway.....	l	yr	y	f	g to vg
Slappey.....	m	yb	ys	f	g
Smock.....	l	y	y	f	g
Victor.....	m	cwb	ew	sc	g
Wonderful.....	l	yb	y	f	vg

The foregoing discussion of varieties with reference to their status in the peach industry of the Ozark region leaves much unsaid that might be added concerning their characteristics. It has seemed unnecessary, however, to carry the discussion further in view of the fact that a single variety—the Elberta—so largely predominates in importance all other sorts. Certain general comments may be added, however, which are pertinent to the variety problem.

Though the later varieties of peaches produced in this region usually bring good prices when they are well grown, the prevalence of peach scab on so many of the late sorts which have been studied has impressed the writers as being a very serious factor in their successful production. In fact, under the usual methods of management that have prevailed in the past, that disease has seemed in many cases to be nearly if not entirely prohibitive of the profitable culture of practically all the late sorts now growing in the principal peach-growing sections of the Ozarks. This statement applies especially to varieties that ripen from about two weeks after the Elberta to the end of the season. However, the recently developed methods of spraying for the control of peach scab, which also include the control of brown-rot, place an entirely different aspect upon the culture of those varieties whose growth heretofore has been impracticable on account of the prevalence of these diseases.<sup>1</sup>

<sup>1</sup> See footnote under "Picquet" (p. 63) for references to literature relating to spraying for the control of peach diseases.

The following lists of varieties for local use and for distant market, suggested for certain portions of the Ozarks by persons well qualified to make recommendations relative thereto, are here inserted because of the importance of considering the variety problem from every standpoint.

In these lists for Arkansas and southern Missouri several varieties are mentioned which are not included in the foregoing discussion of peach varieties. The omission in the discussion is due to the fact that though they may be of value they are not yet much grown, and they do not appear to have made any particular impression, except perhaps very locally, upon the peach industry of this region, so far as the writers have been able to observe.

#### VARIETIES FOR ARKANSAS.<sup>1</sup>

For family use or home market: Victor, Greensboro, Carman, Mountain Rose, Family Favorite, Early Crawford, Belle, Champion, Lee (*General Lee*), Emma, Late Crawford, Oldmixon Free, Lemon Cling, Stump, Picquet, Heath, Wonderful.

For shipping: Mountain Rose, Slappey, Elberta, Emma, Mathews (*Mathews Beauty*), Heath (*Heath Cling*), Salway.

These varieties are named in approximately the order in which they ripen.

#### VARIETIES FOR SOUTHERN MISSOURI.<sup>2</sup>

For a family orchard: Mountain Rose, Reeves, Reynolds, Early Crawford, Gold Dust, Salway, Heath, Picquet.

For a commercial orchard: Mountain Rose, Reynolds, Elberta, Salway, Picquet.

To the last list might also be added possibly "Evans No. 3," a seedling of Elberta which originated on the Olden Fruit Farm, at Olden, Mo., and which has been grown there for some years. It is virtually a "late" Elberta, ripening about 10 days after that variety. It is considered by some as one of the most promising varieties to follow Elberta in sequence of ripening that has appeared.

#### PHENOLOGICAL RECORDS.

In previous bulletins of the Bureau of Plant Industry<sup>3</sup> coordinate in their subject matter with the present one, varietal records compiled in tabular form from data supplied by cooperative observers have been inserted. These records show the blossoming, picking, and other dates which represent the progress of the development of the different varieties during the season, also dates of last killing spring and earliest fall frosts. The records selected for use relate to the more important varieties grown in the region under discussion and in closely adjacent or contiguous regions.

<sup>1</sup> Walker, Ernest. Peach Growing in Arkansas. Bulletin 79, Arkansas Agricultural Experiment Station, ed. 2; rev., 1909, p. 265.

<sup>2</sup> Evans, Paul. Peach Industry in South Missouri. Bulletin 12, Missouri State Fruit Experiment Station, 1904, pp. 9-10.

<sup>3</sup> Bulletin 135, Orchard Fruits in the Piedmont and Blue Ridge Regions of Virginia and the South Atlantic States; and No. 194, Summer Apples in the Middle Atlantic States.

The same general plan is being followed in the present connection, the object being to give exact information regarding the actual as well as the relative blossoming and ripening periods of a few of the representative varieties of apples and the more important varieties of peaches grown in the Ozarks, the occurrence of frosts, etc.

For such data to have any real significance, however, they must be accompanied by certain information relative to the location, elevation, etc., of the trees from which the records were made. Such information is therefore supplied as fully as limited space permits. In the phenological tables which follow, the approximate latitude and elevation of each place of observation are indicated. The observer is designated in the tables by the number which precedes his name in the "List of observers" given in Table VI. By referring to this list it is possible to ascertain the approximate location at which each record was made.

In Tables VI, VII, and VIII the arrangement is from south to north. That is, the southernmost location is given first, each succeeding entry being a more northerly one, except, of course, where succeeding locations may have the same latitude. It should also be stated that the data as tabulated include records supplied by cooperative observers located at points throughout the States of Missouri, Arkansas, and Oklahoma, and are therefore not restricted in their application to the Ozark region.

TABLE VI.—*List of observers who have furnished the phenological data included in this bulletin.*

Ob- serv- er's No.	Name of observer.	Post office.	County.	State.
1	Mrs. M. A. Birks.....	Fordyce.....	Dallas.....	Arkansas.
2	M. V. Lawson.....	Grannis.....	Polk.....	Do.
3	G. H. Burrows.....	do.....	do.....	Do.
4	J. C. Garland.....	Mena.....	do.....	Do.
5	J. C. Smith.....	do.....	do.....	Do.
6	E. W. Phillips.....	Little Rock.....	Pulaski.....	Do.
7	W. H. Campbell.....	Redoak.....	Lonoke.....	Do.
8	Robert Wheeler.....	Tecumseh.....	Pottawatomie.....	Oklahoma.
9	M. Phillips.....	Denver.....	Cleveland.....	Do.
10	J. C. Bauer.....	Judsonia.....	White.....	Arkansas.
11	C. W. Darr.....	Atkins.....	Pope.....	Do.
12	D. M. Thompson.....	Vandale.....	Cross.....	Do.
13	R. Kleiner.....	Wheatland.....	Oklahoma.....	Oklahoma.
14	F. F. Ferguson.....	Union City.....	Canadian.....	Do.
15	Hugo Oberste.....	Hartman.....	Johnson.....	Arkansas.
16	A. W. Poole.....	Ozark.....	Franklin.....	Do.
17	A. S. Perry.....	Yukon.....	Canadian.....	Oklahoma.
18	W. W. Wheeler.....	Sallisaw.....	Sequoyah.....	Do.
19	E. K. Creekmore.....	Mulberry.....	Franklin.....	Arkansas.
20	Z. L. Allen.....	Prairie Grove.....	Washington.....	Do.
21	L. C. Fouquet.....	Chandler.....	Lincoln.....	Oklahoma.
22	J. C. Jamison.....	Guthrie.....	Logan.....	Do.
23	J. W. Hann.....	Westfork.....	Washington.....	Arkansas.
24	E. A. Bullington.....	Lincoln.....	do.....	Do.
25	J. F. Bain.....	do.....	do.....	Do.
26	Arkansas Agricultural Ex- periment Station.	Fayetteville.....	do.....	Do.
27	J. M. Rice.....	Winnview.....	Blaine.....	Oklahoma.
28	D. N. Leerskov.....	Tahlequah.....	Cherokee.....	Do.
29	F. W. Ellis.....	Fayetteville.....	Washington.....	Arkansas.
30	Oklahoma Agricultural Experiment Station.	Stillwater.....	Payne.....	Oklahoma.
31	J. J. Boughton.....	Shafter.....	do.....	Do.

TABLE VI.—*List of observers who have furnished the phenological data included in this bulletin—Continued.*

Ob- serv- er's No.	Name of observer.	Post office.	County.	State.
32	Dr. A. C. Smith.	Springdale.	Washington.	Arkansas.
33	W. J. Patton.	do.	do.	Do.
34	A. M. Kennon.	do.	do.	Do.
35	T. M. Meigs.	Siloam Springs.	Benton.	Do.
36	Robert H. Carl.	Gentry.	do.	Do.
37	J. B. Furrow.	do.	do.	Do.
38	Ozark Orchard Co.	do.	do.	Do.
39	R. J. Maxon.	do.	do.	Do.
40	S. C. Hart.	do.	do.	Do.
41	D. T. Michenor.	Capps.	Boone.	Do.
42	Sherman Ackley.	Keystone.	Pawnee.	Oklahoma.
43	J. M. Taylor.	do.	do.	Do.
44	L. J. Gibson.	Dixie.	do.	Do.
45	J. A. Douglas.	Perry.	Noble.	Do.
46	H. H. Cummins.	Bernardi.	Major.	Do.
47	Carl A. Starck.	Monte Ne.	Benton.	Arkansas.
48	W. P. George.	Berryville.	Carroll.	Do.
49	J. Stiles.	Eureka Springs.	do.	Do.
50	B. F. Putnam.	do.	do.	Do.
51	J. Goldenberg.	do.	do.	Do.
52	C. R. Burnett.	do.	do.	Do.
53	R. Dixon.	do.	do.	Do.
54	W. H. Hopkins.	do.	do.	Do.
55	I. B. Lawton.	Bentonville.	Benton.	Do.
56	D. S. Helvern.	Mammoth Spring.	Fulton.	Do.
57	W. I. Patterson.	Rogers.	Benton.	Do.
58	J. W. McCracken.	Sulphur Springs.	do.	Do.
59	J. D. Yost.	Ketchum.	Mayes.	Oklahoma.
60	John Coleman.	Aline.	Alfalfa.	Do.
61	Ozark Orchard Co.	Lanagan.	McDonald.	Missouri.
62	B. Beaver.	do.	do.	Do.
63	Ozark Orchard Co.	Goodman.	do.	Do.
64	W. C. Paynter.	Koshkonong.	Oregon.	Do.
65	L. G. Sessen.	West Plains.	Howell.	Do.
66	J. F. Christian.	Purdy.	Barry.	Do.
67	Enoch Brown.	Willow Springs.	Howell.	Do.
68	Thomas Brownlee.	do.	do.	Do.
69	M. E. Broadbush.	Seymour.	Webster.	Do.
70	E. E. White.	do.	do.	Do.
71	W. T. Flournoy.	Marionville.	Lawrence.	Do.
72	E. C. Cowles.	do.	do.	Do.
73	J. B. Wild & Bros.	Sarcoxie.	Jasper.	Do.
74	H. Crofoot.	Chillico.	Kay.	Oklahoma.
75	B. C. Auten.	Carthage.	Jasper.	Missouri.
76	G. T. Tippin.	Nichols.	Greene.	Do.
77	J. H. Purrinton.	Elwood.	do.	Do.
78	W. M. Carr.	Oakside.	Shannon.	Do.
79	S. I. Haseltine.	Springfield.	Greene.	Do.
80	P. V. Carvey.	Lutesville.	Bollinger.	Do.
81	W. H. Litson.	Nevada.	Vernon.	Do.
82	J. C. Evans.	Richland.	Pulaski.	Do.
83	R. J. W. Bloom.	do.	do.	Do.
84	W. D. Gibson.	Dixon.	do.	Do.
85	M. S. Barnett.	Cuba.	Crawford.	Do.
86	L. D. Grover.	do.	do.	Do.
87	H. R. Anderson.	Jake Prairie.	do.	Do.
88	J. W. McCormick.	Coffeyton.	do.	Do.
89	Mrs. L. E. Hastings.	Dell.	Benton.	Do.
90	R. C. Tune.	Amoret.	Bates.	Do.
91	M. L. Bonham.	Clinton.	Henry.	Do.
92	J. C. Ruder.	Afton.	St. Louis.	Do.
93	A. J. Davis.	Jefferson City.	Cole.	Do.
94	H. Wm. Thies.	Ferguson.	St. Louis.	Do.
95	Simon Moser.	O'Fallon.	St. Charles.	Do.
96	C. H. Dutcher.	Warrensburg.	Johnson.	Do.
97	Missouri Agricultural Ex- periment Station.	Columbia.	Boone.	Do.
98	W. C. Fourn.	Fulton.	Callaway.	Do.
99	J. H. Darche.	Parkville.	Platte.	Do.
100	H. B. McAfee.	do.	do.	Do.
101	A. L. Norton.	Clarksville.	Pike.	Do.
102	E. Hines.	Carrollton.	Carroll.	Do.
103	F. W. Forward.	Prairie Hill.	Randolph.	Do.
104	G. C. Cole.	Center.	Ralls.	Do.
105	H. A. Squires.	Dearborn.	Buchanan.	Do.
106	L. H. Fisher.	Roger.	Sullivan.	Do.
107	J. W. Turner.	Albany.	Gentry.	Do.
108	Wm. H. Dowell.	Granger.	Scotland.	Do.
109	E. N. Monroe.	Unionville.	Putnam.	Do.

TABLE VII.—*Phenological records of apples.*

BEN DAVIS.

Ob- serv- er's No.	State.	Ap- prox- imate lati- tude.	Eleva- tion.	Slope.	Soil.	Year.	Age of tree.	Date first bloom.	Date full bloom.	Date last spring frost.	Date leaf buds begin to open.	Date terminal buds begin to form.	Date picked (first picking).	Date first fall frost.	Date fit for use.	Keeps until—
1	Arkansas.	33 45	Fed.	Level.	Sandy clay.	1905	Yrs. 8.	Mar. 25	Mar. 31	Mar. 2	Mar. 21	Mar. 21	Aug. —	Nov. 10	Oct. 1	Apr.
4	do.	34 30	1,250	S. E.	Sandy loam.	1907	10	Mar. 20	Mar. 28	do.	Apr. 5	Apr. 5	Sept. 1	do.	Oct. 1	Apr.
5	do.	34 30	1,350	S. E.	do.	1907	6	Mar. 20	Mar. 28	Feb. 16	Apr. 1	Apr. 1	Sept. 1	do.	Oct. 1	Apr.
7	do.	35 0	287	S.	Clay loam.	1903	12	Apr. 4	Apr. 9	Feb. 23	Mar. 24	Mar. 24	Oct. 21	Oct. 21	Oct. 1	Apr.
8	Oklahoma.	35 15	1,026	S.	do.	1905	3	Apr. 4	Apr. 9	Mar. 20	Apr. 4	Apr. 4	Oct. 30	Oct. 30	Oct. 1	Apr.
8	do.	35 15	1,026	S.	do.	1906	4	Apr. 4	Apr. 18	Mar. 20	Apr. 4	Apr. 4	Oct. 30	Oct. 30	Oct. 1	Apr.
9	do.	35 15	1,200	W.	Sandy loam.	1905	9	Apr. 4	Apr. 18	Mar. 20	Apr. 4	Apr. 4	Oct. 30	Oct. 30	Oct. 1	Apr.
12	Arkansas.	35 15	260	S. E.	do.	1904	10	Mar. 20	Apr. 3	Mar. 21	Apr. 4	Apr. 4	Sept. 20	Nov. 3	Sept. 15	Dec.
13	Oklahoma.	35 15	1,250	N. E.	do.	1906	14	Apr. 10	Apr. 16	Mar. 20	Apr. 4	Apr. 4	Sept. 15	Nov. 8	Sept. 15	Spring.
13	do.	35 15	1,250	N. E.	do.	1907	15	Mar. 20	Mar. 21	Apr. 13	Apr. 20	Apr. 20	Sept. 10	Nov. 26	Dec. 1	Spring.
16	Arkansas.	35 30	1,100	W. E.	do.	1902	20	Apr. 14	Apr. 20	Feb. —	Apr. 1	Apr. 1	Sept. 10	Nov. 26	Dec. 1	Spring.
16	do.	35 30	1,100	W. E.	do.	1903	21	Mar. 25	Apr. 5	Apr. 30	Apr. 20	Apr. 20	do	Nov. 17	Nov. 1	Spring.
16	do.	35 30	1,100	W. E.	do.	1905	23	Mar. 29	Apr. 4	Mar. 3	Mar. 25	June 10	do	Nov. 28	Dec. 1	Spring.
16	do.	35 30	1,100	W. E.	do.	1906	24	Mar. 24	Apr. 4	Mar. 3	Mar. 25	June 10	do	Nov. 28	Dec. 1	Spring.
16	do.	35 30	1,100	W. E.	do.	1907	25	Mar. 18	Mar. 25	Feb. 3	Mar. 20	do	do	Nov. 13	Nov. —	Spring.
17	Oklahoma.	35 30	1,250	N.	do.	1904	12	Mar. 26	Apr. 5	Feb. 3	Mar. 15	Aug. 1	do	Nov. 11	Oct. 1	Spring.
19	Arkansas.	35 30	704	S.	do.	1906	12	Mar. 26	Apr. 5	Feb. 3	Mar. 15	Aug. 1	do	Nov. 11	Oct. 1	Spring.
21	Oklahoma.	35 45	1,000	N. W.	do.	1903	11	Apr. 8	Apr. 12	Apr. 30	Apr. 1	Apr. 1	Aug. 1	Nov. 17	July 20	Dec.
21	do.	35 45	1,000	N. W.	do.	1907	15	Apr. 22	Apr. 27	Apr. 30	Apr. 1	Apr. 1	Aug. 1	Nov. 17	July 20	Dec.
22	do.	35 45	992	S.	do.	1904	19	Apr. 22	Apr. 27	Apr. 30	Apr. 1	Apr. 1	Aug. 1	Nov. 17	July 20	Dec.
22	do.	35 45	992	S.	do.	1905	19	Apr. 22	Apr. 27	Apr. 30	Apr. 1	Apr. 1	Aug. 1	Nov. 17	July 20	Dec.
23	Arkansas.	36 0	1,850	Level.	Clay loam.	1904	10	Apr. 11	Apr. 16	Apr. 5	Apr. 10	May 20	Oct. 3	Nov. 11	Oct. 20	Dec.
23	do.	36 0	1,850	Level.	do.	1905	7, 10	Apr. 12	Apr. 17	Apr. 5	Apr. 10	May 20	Oct. 3	Nov. 11	Oct. 20	Dec.
23	do.	36 0	1,850	Level.	do.	1906	8, 11	Apr. 17	Apr. 21	Early.	Apr. 7	July 11	Sept. 22	Nov. 11	Oct. 20	Dec.
23	do.	36 0	1,850	Level.	do.	1907	9, 12	Apr. 17	Apr. 21	Early.	Apr. 7	July 11	Sept. 22	Nov. 11	Oct. 20	Dec.
24	do.	36 0	1,480	E. S.	Sandy loam.	1907	10, 13	Mar. 21	Mar. 26	Feb. 5	Mar. 17	June 24	Oct. 5	Nov. 11	Oct. 20	Dec.
24	do.	36 0	1,480	E. S.	do.	1907	9	Mar. 23	Mar. 26	Feb. 5	Mar. 17	June 24	Oct. 5	Nov. 11	Oct. 20	Dec.
25	do.	36 0	1,480	E. S.	do.	1905	8	Apr. 1	Apr. 14	Feb. 5	Mar. 17	June 24	Oct. 5	Nov. 11	Oct. 20	Dec.
25	do.	36 0	1,480	E. S.	do.	1907	8	Apr. 1	Apr. 14	Feb. 5	Mar. 17	June 24	Oct. 5	Nov. 11	Oct. 20	Dec.
28	Oklahoma.	36 0	800	Level.	do.	1907	8	Mar. 25	Mar. 25	Apr. 10	Apr. 10	Mar. 31	Sept. 25	Nov. 11	Oct. 20	Dec.
32	Arkansas.	36 15	1,350	Level.	Clay loam.	1904	7	Mar. 30	Apr. 7	Mar. 25	Apr. 10	Mar. 31	Sept. 25	Nov. 11	Oct. 20	Dec.
32	do.	36 15	1,350	Level.	do.	1905	9	Mar. 30	Apr. 7	Mar. 25	Apr. 10	Mar. 31	Sept. 25	Nov. 11	Oct. 20	Dec.
32	do.	36 15	1,350	Level.	do.	1906	10	Apr. 4	Apr. 11	Mar. 23	Apr. 10	Mar. 31	Sept. 25	Nov. 11	Oct. 20	Dec.
33	do.	36 15	1,300	W.	do.	1902	14	do	Apr. 7	Mar. 23	Apr. 10	Mar. 31	Sept. 25	Nov. 11	Oct. 20	Dec.
34	do.	36 15	1,400	S.	Clay	1906	15	Apr. 15	Apr. 25	May 14	Mar. 14	July 28	Oct. 10	Nov. 10	Oct. 20	Dec.
34	do.	36 15	1,400	S.	do.	1907	16	Mar. 20	Mar. 25	May 15	Mar. 15	July 25	Oct. 10	Nov. 10	Oct. 20	Dec.
35	do.	36 15	1,200	S.	Clay loam.	1907	20	Mar. 19	Mar. 25	do	Mar. 15	July 25	Oct. 10	Nov. 10	Oct. 20	Dec.
35	do.	36 15	1,200	S.	do.	1907	20	do	Mar. 25	do	Mar. 15	July 25	Oct. 10	Nov. 10	Oct. 20	Dec.
36	do.	36 15	1,237	S.	Gravelly clay.	1907	16	Mar. 25	Mar. 27	Apr. 10	Apr. 28	June —	Sept. 1	Oct. 13	Oct. 20	Dec.
38	do.	36 15	1,250	S.	Sandy loam.	1904	8	Apr. 5	Apr. 25	Apr. 10	Apr. 28	June —	Sept. 1	Oct. 13	Oct. 20	Dec.
38	do.	36 15	1,250	S.	do.	1906	9	Apr. 3	Apr. 6	May 11	Apr. 28	June —	Sept. 1	Oct. 13	Oct. 20	Dec.

39	do.	1,205	36	15	Gravel loam.	1902	9	Apr. 18	Apr. 23	Mar. 20	Apr. 24	June 1	Sept. 15	Nov. 23	Jan. 15
40	do.	1,300	36	15	Clay loam.	1903	10	Apr. 7	Apr. 11	Apr. 30	Apr. 21	June 1	Sept. 15	Oct. 18	Jan. 18
41	do.	1,400	36	15	do.	1904	11	Mar. 16	Apr. 21	Apr. 13	Mar. 23	do	Dec. 1	Oct. 19	Mar. 18
42	do.	1,400	36	15	Sandy loam.	1906	5	Mar. 20	Apr. 21	Apr. 13	Mar. 23	June 20	Oct. 12	Oct. 19	Feb. 18
43	Oklahoma.	700	36	15	do.	1907	5	Mar. 20	Mar. 25	Mar. 5	Mar. 18	June 20	Oct. 12	Nov. 11	Apr. 18
44	do.	1,000	36	15	Sandy loam.	1905	10	do	Mar. 25	Mar. 5	do	do	Oct. 15	Nov. 10	Feb. 18
45	do.	915	36	15	Clay loam.	1907	8	Apr. 22	Mar. 25	Apr. 28	Mar. 21	Nov. 1	Oct. 28	Nov. 10	Jan. 18
46	do.	1,100	36	15	Clay loam.	1905	11	Mar. 22	Mar. 24	Apr. 13	Mar. 21	Nov. 1	Oct. 28	Nov. 11	do.
47	Arkansas.	1,385	36	15	Sandy loam.	1902	10	Apr. 4	Apr. 16	Mar. 30	Apr. 6	July 5	Sept. 5	late	Feb. 18
48	do.	1,250	36	30	Clay loam.	1902	9	Apr. 18	Apr. 24	Mar. 30	Apr. 6	July 5	Sept. 5	late	Feb. 18
49	do.	1,250	36	30	Clay loam.	1902	7	Apr. 6	Apr. 22	Mar. 20	Apr. 5	Oct. 15	Oct. 15	Nov. 26	Nov. 15
50	do.	1,500	36	30	Chert.	1904	13	Apr. 10	Apr. 15	Mar. 31	Apr. 5	Oct. 6	Oct. 6	Nov. 18	Apr. 18
51	do.	1,500	36	30	do.	1905	14	Apr. 3	Apr. 17	Feb. 10	Apr. 5	June 10	Oct. 10	Nov. 18	Nov. 15
52	do.	1,500	36	30	do.	1907	16	Mar. 17	Mar. 25	Apr. 12	Mar. 18	June 12	Oct. 2	Oct. 21	Dec. 1
53	do.	1,550	36	30	Clay loam.	1903	6	Apr. 5	Apr. 12	Apr. 1	Mar. 20	Sept. 1	Oct. 14	Oct. 14	Dec. 1
54	do.	1,375	36	30	Chert.	1902	6	Apr. 20	Apr. 24	Apr. 31	Apr. 10	Sept. 1	Oct. 14	Nov. 26	Jan. 1
55	do.	1,600	36	30	do.	1902	9	Apr. 19	do	do	do	Sept. 25	Sept. 25	Nov. 27	Dec. 1
56	do.	1,300	36	30	Sandy loam.	1902	10	Apr. 15	Apr. 20	Apr. 19	Apr. 7	June 12	Oct. 26	Nov. 11	May. 18
57	do.	1,300	36	30	do.	1903	11	Apr. 4	Apr. 10	May 1	Mar. 14	July 12	Oct. 16	Oct. 25	Spring.
58	do.	925	36	30	Chert.	1906	13	Apr. 14	Apr. 18	Apr. 17	Mar. 14	June 6	Aug. 10	Oct. 20	Dec. 20
59	Oklahoma.	700	36	30	Sandy loam.	1907	8	Mar. 23	Mar. 27	Apr. 13	Mar. 25	June 16	Sept. 15	Oct. 10	Mar. 18
60	do.	1,400	36	30	Clay loam.	1906	9	Apr. 12	Apr. 20	Apr. 13	Mar. 25	June 16	Sept. 18	Oct. 9	Nov. 18
61	Missouri.	950	36	30	Clay loam.	1907	5	Mar. 22	Apr. 26	Apr. 29	Mar. 12	June 15	Oct. 10	Nov. 11	May. 18
62	do.	950	36	30	do.	1903	5	Apr. 18	May 3	Apr. 29	Mar. 12	June 15	Oct. 26	Nov. 11	May. 18
63	do.	1,200	36	30	Black loam.	1904	7	Apr. 8	Apr. 13	May 1	Apr. 2	July 12	Oct. 16	Oct. 25	Spring.
64	do.	1,200	36	30	do.	1905	6	Apr. 15	Apr. 20	Apr. 15	Apr. 5	June 6	Aug. 10	Oct. 20	Dec. 20
65	do.	1,250	36	30	Clay loam.	1906	9	Apr. 10	do	Apr. 10	Apr. 6	do	Sept. 10	Oct. 10	Mar. 18
66	do.	960	36	45	do.	1902	6	Apr. 15	do	Apr. 10	do	do	Sept. 15	Oct. 10	Feb. 18
67	do.	960	36	45	do.	1902	12	Apr. 26	May 1	Apr. 8	Apr. 18	do	Sept. 30	Nov. 21	Feb. 18
68	do.	1,482	37	0	Black loam.	1907	15	Mar. 21	Apr. 12	Apr. 14	Mar. 18	do	Oct. 8	late	Mar. 18
69	do.	1,350	37	0	Gravel loam.	1903	6	Apr. 8	Apr. 12	Apr. 30	Apr. 8	do	Oct. 28	Oct. 28	Mar. 18
70	do.	1,350	37	0	do.	1904	7	Apr. 4	do	Mar. 15	Mar. 23	July 10	Sept. 25	Oct. 13	Mar. 18
71	do.	1,650	37	0	Clay.	1902	10	Mar. 25	Apr. 29	Apr. 15	Mar. 20	June 15	Sept. 25	Oct. 13	Mar. 18
72	do.	1,250	37	0	Chert.	1907	14	Apr. 24	Mar. 31	Apr. 13	Mar. 23	June 15	Sept. 25	Oct. 13	Mar. 18
73	do.	1,250	37	0	Clay.	1904	17	Mar. 24	Mar. 27	May 13	Mar. 23	do	Oct. 13	Oct. 13	Mar. 18
74	do.	1,300	37	0	Clay loam.	1907	16	Apr. 7	Apr. 23	May 1	Mar. 13	do	Oct. 23	Oct. 23	Mar. 18
75	do.	1,000	37	0	do.	1903	12	Apr. 8	Apr. 21	May 1	Apr. 5	May 26	Sept. 15	Oct. 2	Mar. 18
76	Oklahoma.	1,268	37	15	Light loam.	1905	16	Apr. 12	Apr. 19	Mar. 8	Apr. 5	May 26	Sept. 15	Oct. 20	Mar. 18
77	Missouri.	1,268	37	15	Dark loam.	1902	12	Apr. 8	Apr. 19	Mar. 4	Mar. 25	Sept. 1	Sept. 15	Oct. 20	Jan. 18
78	do.	1,300	37	15	Gravel loam.	1902	17	Apr. 16	Apr. 22	do	Apr. 23	Aug. 26	Sept. 1	Nov. 17	Jan. 18
79	do.	1,300	37	15	Clay loam.	1902	5	Apr. 20	Apr. 26	Apr. 23	Mar. 25	July 10	Sept. 1	Nov. 17	Mar. 18
80	do.	1,300	37	15	do.	1903	6	Apr. 10	Apr. 18	Apr. 23	Mar. 25	June 18	Sept. 1	Oct. 18	Mar. 18
81	do.	1,300	37	15	do.	1905	8	Apr. 14	Apr. 21	Apr. 27	Apr. 3	June 17	Sept. 27	Oct. 12	Mar. 18
82	do.	1,000	37	15	do.	1903	9	Apr. 9	Apr. 13	Apr. 22	Apr. 7	June 15	Sept. 27	Nov. 13	Mar. 18
83	do.	1,300	37	15	do.	1907	25	Mar. 25	Apr. 1	May 1	Apr. 8	July 20	Sept. 27	Nov. 13	Mar. 18
84	do.	1,300	37	15	Black loam.	1907	7	do	do	Apr. 17	Apr. 11	do	Oct. 1	Oct. 20	Mar. 18
85	do.	650	37	15	Clay.	1907	7	do	do	Apr. 17	Apr. 11	do	Oct. 1	Oct. 20	Mar. 18
86	do.	820	37	45	Sandy loam.	1906	10	Apr. 16	Apr. 19	May 8	Apr. 17	do	Oct. 1	Oct. 20	Mar. 18
87	do.	1,450	38	0	Clay.	1902	10	Apr. 12	Apr. 25	Apr. 8	Apr. 28	July 15	Sept. 15	Oct. 14	May. 18
88	do.	1,450	38	0	do.	1904	12	do	Apr. 28	Apr. 14	Apr. 10	July 20	Oct. 15	Nov. 18	Do.

TABLE VII.—*Phenological records of apples—Continued.*

BEN DAVIS—Continued.

Ob- serv- er's No.	State.	Ap- proxi- mate lati- tude.	Eleva- tion.	Slope.	Soil.	Year.	Age of tree.	Date full bloom.	Date last spring frost.	Date leaf buds begin to open.	Date terminal buds begin to form.	Date picked (first picking).	Date first fall frost.	Date fit for use.	Keeps until—
82	Missouri	38 0	<i>Fed.</i>		Clay	1905	Yrs. 13	Apr. 20	Apr. 28	Apr. 24	Apr. 25	Oct. 10	Oct. 12	Aug. 1	May.
82	do.	38 0	1,450	SE.	do.	1906	14	do.	Apr. 25	Apr. 17	do.	Oct. 20	Nov. 1	Sept. 1	June.
83	do.	38 0	1,150	SE.	do.	1907	8	Mar. 18	Mar. 19	Apr. 7	do.	Oct. 10	Oct. 10	do.	
84	do.	38 0	1,300	N.	Clay loam.	1907	11	Mar. 25	Apr. 25	Apr. 25	Mar. 23	do.	Oct. 12	do.	
85	do.	38 0	950	N.	do.	1907	10	do.	Apr. 14	do.	do.	do.	do.	do.	
86	do.	38 0	1,000	E.	Clay	1905	14	Apr. 9	Apr. 18	Apr. 6	June 20	Oct. 4	Oct. 12	Oct. 11	Mar.
86	do.	38 0	1,000	E.	do.	1906	15	Apr. 9	Apr. 24	Apr. 10	May 25	Oct. 1	Oct. 20	Nov. 1	Do.
87	do.	38 0	1,000	E.	do.	1907	16	Mar. 26	Mar. 30	Apr. 10	June 15	Oct. 1	Oct. 10	do.	
87	do.	38 0	1,000	N., E.	do.	1905	13	Apr. 9	Apr. 25	Apr. 16	July —	Sept. 22	Oct. 10	Aug. —	Jan.
87	do.	38 0	1,000	N., E.	do.	1906	14	Apr. 21	Apr. 25	Apr. 8	do.	Oct. 5	Oct. 16	do.	
87	do.	38 0	1,000	N., E.	do.	1907	15	Mar. 26	Mar. 29	Apr. 14	July 1	do.	Oct. 5	do.	
88	do.	38 0	1,100	All.	Sandy loam.	1907	10	do.	Apr. 23	Mar. 20	July 15	Oct. 10	Oct. 5	do.	
89	do.	38 15	750	NE.	do.	1902	8	Apr. 17	Apr. 17	Mar. 20	do.	Oct. 10	Oct. 5	do.	
90	do.	38 15	850	Level.	Black loam.	1907	10	Mar. 25	Mar. 30	May 12	Aug. 1	Oct. 13	Oct. 13	do.	
92	do.	38 30	550	SE.	Sandy loam.	1905	12	Apr. 9	Apr. 11	Mar. 29	Sept. 1	Sept. 29	Oct. 22	Oct. 3	Do.
92	do.	38 30	550	SE.	do.	1906	13	Apr. 22	Apr. 26	Apr. 10	Aug. 20	Sept. 20	Oct. 11	Sept. 30	Do.
92	do.	38 30	550	SE.	do.	1907	14	Mar. 27	Mar. 30	Apr. 11	Aug. 25	Sept. 25	Oct. 15	do.	
93	do.	38 30	540	All.	Clay loam.	1904	8	Apr. 23	May 1	May 2	June 15	Oct. 21	Oct. 23	Sept. 30	Apr.
94	do.	38 30	500	Level.	Black loam.	1905	10	Apr. 20	Apr. 25	do.	do.	Oct. 15	Oct. 7	Sept. 20	Do.
95	do.	38 45	800	N.W.	do.	1902	7	Apr. 20	Apr. 25	Apr. 1	June 15	Oct. 15	Oct. 15	Sept. 30	Dec.
95	do.	38 45	800	N.W.	do.	1903	8	Apr. 18	May 4	Apr. 15	June 20	Sept. 20	Oct. 11	Sept. 30	Nov.
95	do.	38 45	800	N.W.	do.	1904	9	Apr. 8	Early.	Apr. 3	June 20	Sept. 25	Oct. 8	Aug. 30	Dec.
95	do.	38 45	800	N.W.	do.	1905	10	Apr. 20	Apr. 25	May 2	June 18	Aug. 30	Oct. 8	do.	
95	do.	38 45	800	N.W.	do.	1906	11	Early.	Mar. 28	May 4	do.	do.	do.	do.	
96	do.	38 45	800	N.W.	do.	1907	Old.	do.	Mar. 28	May 4	Sept. 19	Oct. 14	Oct. 14	do.	
97	do.	39 0	700	W.	Clay	1902	7	Apr. 22	May 2	Apr. 8	do.	Oct. 18	Oct. 18	do.	
97	do.	39 0	700	W.	do.	1903	8	Apr. 11	Apr. 12	Apr. 1	Aug. 29	Oct. 23	Oct. 23	do.	
97	do.	39 0	700	W.	do.	1904	9	Apr. 29	May 5	Apr. 25	July 1	Oct. 21	Oct. 21	do.	
97	do.	39 0	700	W.	do.	1905	10	Apr. 29	Apr. 29	May 9	June 16	Oct. 10	Oct. 10	do.	
97	do.	39 0	700	W.	do.	1906	11	Apr. 22	Apr. 29	May 9	June 18	Oct. 10	Oct. 10	do.	
97	do.	39 0	700	W.	do.	1907	12	Mar. 27	Apr. 9	May 4	June 18	Oct. 17	Oct. 17	do.	
98	do.	39 0	900	S.	Sandy clay	1907	10	Mar. 30	Apr. 23	Apr. 20	do.	Oct. 1	Nov. 1	Nov. 1	Apr.
99	do.	39 15	800	S.	do.	1905	12	Apr. 21	May 1	Apr. 7	do.	Sept. 15	Oct. 25	Sept. 15	
100	do.	39 15	900	S.	Clay loam.	1905	10	Apr. 5	Apr. 15	Apr. 4	Sept. 15	Oct. 25	Oct. 25	Oct. 15	
101	do.	39 15	466	S.	Sandy loam	1907	5	Apr. 2	Apr. 18	May 2	July 15	Oct. 22	Oct. 22	do.	
102	do.	39 30	900	SW.	do.	1904	11	May 3	May 6	May 1	May 30	Oct. 21	Oct. 21	do.	
102	do.	39 30	900	SW.	do.	1905	12	do.	Apr. 18	Apr. 10	May 16	Oct. 8	Oct. 10	Oct. 8	Do.
102	do.	39 30	900	SW.	do.	1906	13	Apr. 25	Apr. 28	Apr. 16	May 30	Oct. 8	Oct. 10	Oct. 8	

103	do.	39	30	725	N.W.	Dark loam.	1904	6	May 6	May 9	Apr. 12	May 12	July 30	Nov. 10	Oct. 22	Dec. 20	May.
103	do.	39	30	725	N.W.	do.	1905	7	Apr. 17	Apr. 28	Apr. 15	Apr. 16	do.	Oct. 19	Oct. 28	Dec. 1	Apr.
103	do.	39	30	725	N.W.	do.	1906	8	Apr. 29	May 5	May 4	May 27	Aug. 5	Oct. 13	Oct. 13	Dec. 1	Apr.
103	do.	39	30	725	N.W.	do.	1907	9	Apr. 9	Apr. 27	Apr. 25	Mar. 25	Aug. 10	Oct. 12	Oct. 12	Dec. 1	Apr.
104	do.	39	30	700	E., N.	Light loam.	1904	14	Apr. 15	Apr. 27	Apr. 15	Apr. 10	Sept. 1	Oct. 20	Nov. 1	Sept. 1	Mar.
105	do.	39	30	1,000	S., S.	Clay loam.	1905	10	Apr. 25	Apr. 27	do.	Apr. 10	July 30	Oct. 15	Nov. 25	Oct. 10	Do.
105	do.	39	30	1,000	S., E.	do.	1906	11	Apr. 25	Apr. 27	do.	Apr. 10	June 30	Oct. 15	Nov. 25	Oct. 10	Do.
105	do.	39	30	1,000	S., E.	do.	1907	12	Apr. 25	Apr. 27	do.	Apr. 10	June 30	Oct. 15	Nov. 25	Oct. 10	Do.
105	do.	39	30	1,000	S., E.	Clay.	1902	6	Apr. 28	Apr. 25	May 3	Mar. 28	June 30	Oct. 16	Oct. 13	Dec. 1	Do.
106	do.	40	15	850	S., E.	do.	1903	7	Apr. 21	Apr. 27	Apr. 26	Apr. 10	June 30	Oct. 20	Oct. 13	Dec. 1	Do.
106	do.	40	15	850	S., E.	do.	1904	8	May 7	May 13	Apr. 22	Apr. 28	June 10	Oct. 3	Oct. 13	Nov. 10	Do.
106	do.	40	15	850	S., E.	do.	1905	9	Apr. 27	May 2	May 9	Apr. 18	June 14	Oct. 3	Oct. 9	Dec. 1	Do.
106	do.	40	15	850	S., E.	do.	1906	10	do.	May 2	May 9	Apr. 18	June 14	Oct. 3	Oct. 9	Dec. 1	Do.
107	do.	40	15	700	Level.	Clay loam.	1905	10	Apr. 23	Apr. 27	May 3	Apr. 16	June 8	Oct. 15	Oct. 21	Nov. 1	Do.
108	do.	40	30	700	Level.	Black loam.	1903	6	do.	do.	May 4	Apr. 25	Sept. 5	Oct. 15	Oct. 15	Dec. 1	Do.
109	do.	40	30	990	All.	do.	1904	8	May 4	May 13	Apr. 25	Apr. 24	Sept. 5	Oct. 15	Oct. 15	Dec. 1	Do.

G. RIMES.

9	Oklahoma.	35	15	1,200	W.	Sandy loam.	1905	9	Mar. 26	Apr. 1	Apr. 30	Mar. 26	July 26	Sept. 1	Oct. 16	Aug. 1	Oct.
21	do.	35	45	1,000	N.W.	do.	1903	11	Apr. 10	Apr. 16	Apr. 17	Mar. 28	July 4	Sept. 1	Nov. 17	Sept. 1	Oct.
23	Arkansas.	36	0	1,850	Level.	Clay loam.	1904	8	do.	Apr. 10	Apr. 17	Mar. 28	July 4	Sept. 1	Nov. 17	Sept. 1	Oct.
23	do.	36	0	1,850	Level.	do.	1905	9	Apr. 2	Apr. 10	Early	Apr. 8	do.	Sept. 4	Oct. 31	Aug. 28	Oct.
23	do.	36	0	1,850	Level.	do.	1906	10	Apr. 17	Apr. 21	Feb. 5	Apr. 13	do.	Sept. 4	Nov. 11	Aug. 10	Do.
23	do.	36	0	1,850	Level.	do.	1907	11	Mar. 20	Mar. 24	Feb. 10	Mar. 22	June 24	Aug. 14	Nov. 15	Aug. 30	Sept.
28	Oklahoma.	36	30	800	N.	Sandy loam.	1902	5	Mar. 20	Mar. 24	Feb. 10	Mar. 22	June 24	Aug. 14	Nov. 15	Nov. 1	Spring.
53	Arkansas.	36	30	1,575	N.	Chert.	1902	6	Apr. 19	Mar. 24	Feb. 10	Mar. 22	June 24	Aug. 14	Nov. 15	Nov. 1	Spring.
63	Missouri.	37	0	1,250	S.	Clay loam.	1902	6	Apr. 16	Apr. 20	Mar. 31	Mar. 22	June 24	Aug. 14	Nov. 15	Nov. 1	Spring.
69	do.	37	0	1,650	N.	Clay	1902	6	Apr. 16	Apr. 20	Mar. 31	Mar. 22	June 24	Aug. 14	Nov. 15	Nov. 1	Spring.
71	do.	37	0	1,250	N.	do.	1907	12	Mar. 25	Apr. 20	May 13	do.	June 15	Sept. 6	Nov. 26	Oct. 1	Dec.
72	do.	37	0	1,300	Level.	Clay loam.	1904	16	Apr. 11	Apr. 20	May 13	Apr. 19	June 15	Sept. 6	Nov. 26	Oct. 1	Dec.
84	do.	38	0	1,200	N.	do.	1907	4	Mar. 27	Mar. 30	Apr. 25	Mar. 26	June 15	Sept. 6	Nov. 26	Oct. 1	Dec.
89	do.	38	15	750	N.E.	Sandy loam.	1902	8	Apr. 17	Apr. 23	Apr. 25	Mar. 26	June 15	Sept. 6	Nov. 26	Oct. 1	Dec.
90	do.	38	15	850	Level.	Black loam.	1907	8	Apr. 17	Apr. 23	Apr. 25	Mar. 26	June 15	Sept. 6	Nov. 26	Oct. 1	Dec.
92	do.	38	30	550	S.E.	Sandy loam.	1905	12	Apr. 9	Apr. 11	May 12	Mar. 20	Aug. 1	Sept. 1	Oct. 13	Sept. 10	Sept.
93	do.	38	30	540	All.	Clay loam.	1904	8	Apr. 24	Apr. 29	May 2	Apr. 5	June 10	Sept. 15	Oct. 23	Sept. 15	Mar.
95	do.	38	45	800	N.W.	do.	1902	7	Apr. 22	May 1	Apr. 15	Apr. 22	June 20	Nov. 20	Oct. 7	do.	Apr.
95	do.	38	45	800	N.W.	do.	1903	8	Apr. 6	Apr. 14	Apr. 15	Apr. 20	June 20	Sept. 18	Oct. 15	Aug. 25	Dec.
95	do.	38	45	800	N.W.	do.	1904	9	Apr. 18	May 4	Early	Apr. 30	June 20	Sept. 18	Oct. 15	Aug. 25	Dec.
95	do.	38	45	800	N.W.	do.	1905	10	Apr. 20	Apr. 8	May 2	Apr. 24	June 2	Sept. 10	Oct. 8	Aug. 10	Do.
95	do.	38	45	800	N.W.	do.	1906	11	Apr. 20	Apr. 8	May 2	Apr. 24	June 2	Sept. 10	Oct. 8	Aug. 10	Nov.
95	do.	38	45	800	N.W.	do.	1907	12	Mar. 28	Mar. 28	Apr. 14	Apr. 28	June 2	Sept. 10	Oct. 8	Aug. 10	Nov.
97	do.	38	45	800	N.W.	do.	1902	5	Apr. 12	Apr. 12	May 1	Apr. 4	Sept. 6	Sept. 10	Oct. 8	Aug. 10	Nov.
97	do.	39	0	700	W.	Clay.	1903	6	Apr. 12	Apr. 12	May 1	Apr. 4	Sept. 6	Sept. 10	Oct. 8	Aug. 10	Nov.
97	do.	39	0	700	W.	do.	1904	7	Apr. 29	May 5	Apr. 25	Apr. 26	Sept. 6	Sept. 10	Oct. 8	Aug. 10	Nov.
97	do.	39	0	700	W.	do.	1905	8	Apr. 29	May 5	Apr. 25	Apr. 26	Sept. 6	Sept. 10	Oct. 8	Aug. 10	Nov.
97	do.	39	0	700	W.	do.	1906	9	Apr. 29	May 5	Apr. 25	Apr. 26	Sept. 6	Sept. 10	Oct. 8	Aug. 10	Nov.
97	do.	39	0	700	W.	do.	1907	10	Mar. 29	Apr. 30	May 4	Apr. 28	June 30	Sept. 15	Oct. 21	Sept. 19	Feb.
98	do.	39	0	900	S.	Sandy clay.	1907	10	Apr. 2	Apr. 22	Apr. 29	Mar. 30	Aug. 10	Sept. 22	Oct. 17	Sept. 25	Feb.

TABLE VII.—*Phenological records of apples—Continued.*

GRIMES—Continued.

Ob- serv- er's No.	State.	Ap- proxi- mate lati- tude.	Eleva- tion.	Slope.	Soil.	Year.	Age of tree.	Date first bloom.	Date full bloom.	Date last spring frost.	Date leaf buds begin to open.	Date terminal buds begin to form.	Date picked (first picking).	Date first fall frost.	Date fit for use.	Keeps until—
101	Missouri	39 15	<i>Fect.</i> 466	S.	Sandy loam.	1907	Yrs. 5	Apr. 2	Apr. 8	May 2	Apr. 4	Sept. 15		Oct. 25		
102	do.	39 30	900	SW.	do.	1904	9	May 1	May 5		Apr. 28	July 15		Oct. 22		
106	do.	40 15	850	S. E.	Clay.	1902	6	Apr. 29	May 2	Apr. 22	Apr. 20	June 20	Sept. 25	Oct. 13	Nov. 15	Dec.
106	do.	40 15	850	S. E.	do.	1906	10	Apr. 27	do.	May 9	Apr. 18	June 8	Sept. 27	Oct. 9	Nov. —	Jan.
107	do.	40 15	700		do.	1905	7	Apr. 25	May 1	Apr. 15	Apr. 10	June 8		Oct. 21		

## INGRAM.

38	Arkansas.	36 15	1,250	S.	Sandy loam.	1904	4	Apr. 15	Apr. 20	Apr. 10	Apr. 30	Nov. 1	Sept. 5	Oct. 21		
44	Oklahoma.	36 15	1,000	Level.	do.	1905	8	Apr. 9	Apr. 16	Mar. 28	Apr. 6	Nov. 1	Oct. 28	Nov. 16		
55	Arkansas.	36 30	1,300	E. W.	do.	1903	8	Apr. 7	Apr. 12	May 1	Mar. 15					
68	Missouri.	37 0	1,350	All.	Gravel loam.	1903	6	Apr. 22	Apr. 30	Apr. 30	Apr. 18	July 19		Oct. 28		
71	do.	37 0	1,350	All.	do.	1904	7	Apr. 19	Apr. 25							
73	do.	37 0	1,250	N.	Clay.	1907	17	Mar. 27	Apr. 3	May 13				Oct. 2		
79	do.	37 15	1,000	Level.	Black loam.	1903	25	Apr. 5	Apr. 8	May 1	Apr. 12	June 20		Oct. 23		
93	do.	38 30	500	All.	Clay loam.	1904	10	May 1	May 8	Apr. 2	Apr. 7	Sept. 24		Oct. 14		
97	do.	39 0	700	W.	Clay.	1902	3			Apr. 8	Apr. 5		May 1	Oct. 18		
97	do.	39 0	700	W.	do.	1903	4			May 1	Apr. 29	July 14		Oct. 23		
97	do.	39 0	700	W.	do.	1904	5			Apr. 25	Apr. 20	June 10		Oct. 21		
97	do.	39 0	700	W.	do.	1905	6	Apr. 30	May 9	Apr. 18	Apr. 22	June 28		Oct. 10		
97	do.	39 0	700	W.	do.	1906	7	Apr. 30	Apr. 29	May 9	Mar. 29	June 20		Oct. 12		
97	do.	39 0	700	W.	do.	1907	8	Apr. 24	Apr. 29	May 4						

## JONATHAN.

9	Oklahoma.	35 15	1,200	W.	Sandy loam.	1905	9	Apr. 2	Apr. 10	Mar. 20	Mar. 26	Aug. 30	Sept. 30	Oct. 16	Sept. —	Dec.
13	do.	35 15	1,250	NE.	do.	1906	14	Apr. 20	Mar. 25	Apr. 13	Apr. 3	Aug. 1	Aug. 15	Nov. 3	July 25	Oct.
13	do.	35 15	1,250	NE.	do.	1907	5	Mar. 20	Apr. 10	Apr. 3	Mar. 20	Oct. 1	do.	Nov. 8	Aug. 1	Jan.
16	Arkansas.	35 30	1,100	W. E.	do.	1906	6	Apr. 10	Apr. 12	Mar. 3	Mar. 26	June 15	Sept. 1	Nov. 13	Oct. —	Dec.
16	do.	35 30	1,100	W. E.	do.	1907	6	Mar. 16	Apr. 24	Feb. 3	Mar. 8	Sept. 1	Aug. 1	Nov. 11	Aug. 15	Sept.
21	Oklahoma.	35 45	1,000	NW.	do.	1903	10	Mar. 22	Mar. 26	Apr. 30			Sept. 1	Nov. 17	Aug. 1	Oct.
21	do.	35 45	1,000	NW.	do.	1907	14	Mar. 23	Apr. 19	Apr. 19			Aug. 15	Nov. 11	Aug. 1	Oct.

22	do.	922	S.	do.	1904	9	Apr. 20	Apr. 27	Mar. 26	Apr. 17	May 25	.....	Oct. 26
22	do.	922	S.	do.	1905	10	Apr. 4	Apr. 9	Apr. 5	Mar. 25	Apr. 15	Sept. 12	Oct. 31
23	Arkansas.	1,850	Level	Clay loam.	1905	7	do.	Apr. 20	Early.	Mar. 7	June 2	Sept. 11	Oct. 11
23	do.	1,850	Level	do.	1906	8	Apr. 17	Apr. 26	Feb. 13	do.	July 5	Sept. 10	Nov. 11
23	do.	1,850	Level	do.	1907	9	Mar. 21	Mar. 26	Feb. 5	Mar. 17	Sept. 24	Sept. 8	Oct. 15
24	do.	1,480	E. S.	Sandy loam.	1907	9	Mar. 19	Mar. 26	Feb. 13	do.	June 2	Sept. 10	Oct. 16
25	do.	1,400	N.W.	do.	1905	8	Mar. 1	Mar. 27	Feb. 5	do.	Sept. 24	Sept. 8	Oct. 16
25	do.	800	Level.	do.	1907	5	Mar. 20	Mar. 27	Feb. 10	Apr. 10	Aug. 5	Sept. 10	Oct. 10
28	Oklahoma.	1,250	S.	do.	1904	7	Apr. 5	Apr. 20	Mar. 10	Mar. 20	Apr. 5	Nov. 1	Nov. 1
38	Arkansas.	1,250	N.W.	do.	1907	5	Mar. 20	Mar. 26	Mar. 5	Mar. 18	Oct. 1	Sept. 1	Nov. 1
42	Oklahoma.	700	N.W.	do.	1905	11	Mar. 22	Mar. 25	Mar. 28	Mar. 21	Oct. 25	Oct. 28	Nov. 11
44	do.	915	E.	Clay loam.	1907	8	Apr. 5	Apr. 23	Mar. 31	Mar. 21	Oct. 25	Oct. 28	Nov. 11
45	do.	36	Level.	do.	1905	11	Mar. 22	Mar. 25	Mar. 28	Mar. 21	Oct. 25	Oct. 28	Nov. 11
54	Arkansas.	1,300	E. W.	Chert.	1902	8	Apr. 6	Apr. 10	May 1	Mar. 25	June 10	Sept. 20	Nov. 16
55	do.	1,300	E. W.	Sandy loam.	1903	8	Apr. 6	Apr. 10	May 1	Mar. 25	June 10	Sept. 20	Nov. 16
57	do.	36	Level.	do.	1905	7	Apr. 1	Apr. 9	Apr. 13	Mar. 28	June 10	Sept. 1	Oct. 9
58	do.	36	N.	Clay loam.	1907	10	Mar. 23	Mar. 27	Apr. 22	Mar. 18	June 15	Sept. 1	Oct. 11
60	Oklahoma.	1,400	W.	Sandy loam.	1907	10	Mar. 23	Mar. 27	Apr. 22	Mar. 18	June 15	Sept. 1	Oct. 11
61	Missouri.	700	S.E.	Blue loam.	1903	7	Apr. 14	Apr. 23	May 1	Apr. 3	July 6	Sept. 1	Oct. 16
63	do.	1,250	S.	Clay loam.	1902	6	Apr. 4	Apr. 23	Mar. 15	do.	June 15	Sept. 1	Oct. 16
69	do.	1,650	N.	Clay.	1907	10	Mar. 27	Apr. 21	Mar. 25	Mar. 18	June 15	Sept. 1	Oct. 16
70	do.	1,650	N.	Chert.	1907	10	Mar. 27	Apr. 21	Mar. 25	Mar. 18	June 15	Sept. 1	Oct. 16
73	do.	1,000	Level.	Light loam.	1903	8	Apr. 4	Apr. 23	Mar. 15	do.	June 15	Sept. 1	Oct. 16
74	Oklahoma.	1,150	N.	Clay loam.	1905	12	Apr. 7	Apr. 21	May 1	Apr. 1	May 31	Sept. 1	Oct. 20
84	Missouri.	1,300	N.	Clay.	1907	4	Mar. 26	Apr. 21	Mar. 25	Mar. 22	May 21	Sept. 1	Oct. 20
86	do.	1,000	E.	do.	1905	14	Apr. 9	Apr. 24	Apr. 25	Apr. 1	May 21	Sept. 1	Oct. 20
86	do.	1,000	E.	do.	1906	15	Apr. 21	Apr. 24	Apr. 14	Apr. 22	June 10	Sept. 1	Oct. 20
87	do.	1,000	W.	do.	1907	16	Mar. 26	Apr. 15	Apr. 16	Mar. 28	July	do.	Oct. 10
87	do.	1,000	W.	do.	1905	3	Apr. 21	Apr. 25	do.	Apr. 8	July	do.	Oct. 10
87	do.	1,000	W.	do.	1906	4	Apr. 21	Apr. 25	do.	Apr. 8	July	do.	Oct. 10
87	do.	1,000	W.	do.	1907	5	Mar. 25	Mar. 30	Apr. 14	Mar. 15	July 25	Oct. 16	Oct. 16
88	do.	1,000	All.	Sandy loam.	1907	6	Mar. 24	Mar. 30	Apr. 14	Mar. 15	July 25	Oct. 16	Oct. 16
89	do.	750	N.E.	do.	1902	8	Apr. 14	Apr. 19	Apr. 12	Mar. 20	July 15	Oct. 5	Oct. 5
90	do.	850	Level.	Black loam.	1907	12	Apr. 24	Apr. 28	May 12	Mar. 20	Aug. 1	Sept. 1	Oct. 13
96	do.	700	W.	Clay	1907	7	Early	Mar. 26	May 4	Mar. 2	Aug. 1	Sept. 1	Oct. 13
97	do.	700	W.	do.	1902	8	Apr. 23	May 2	May 8	Apr. 2	Sept. 22	Sept. 14	Oct. 14
97	do.	700	W.	do.	1903	8	Apr. 11	Apr. 12	May 1	Apr. 1	Aug. 30	Sept. 14	Oct. 18
97	do.	700	W.	do.	1904	9	Apr. 7	Apr. 16	Apr. 25	Apr. 22	July 6	Oct. 23	Oct. 23
97	do.	700	W.	do.	1905	10	Apr. 7	Apr. 16	Apr. 25	Apr. 2	June 9	Oct. 21	Oct. 21
97	do.	700	W.	do.	1906	11	Apr. 22	Apr. 28	May 9	Apr. 18	June 20	Sept. 18	Oct. 10
97	do.	700	W.	do.	1907	12	Mar. 26	Apr. 10	May 4	Mar. 27	July 21	Sept. 19	Oct. 12
98	do.	900	S.	Sandy clay	1907	10	Mar. 28	Apr. 24	Apr. 29	Apr. 26	Oct. 10	Sept. 20	Oct. 17
99	do.	800	All.	Clay	1906	12	Mar. 28	Apr. 24	May 9	Apr. 10	Sept. 15	Sept. 25	Nov. 1
101	do.	465	S.	do.	1907	5	Apr. 2	Apr. 8	May 2	Apr. 4	Sept. 15	Sept. 25	Oct. 25
102	do.	39	SW.	Sandy loam.	1907	9	May 1	May 5	May 2	Apr. 25	July 15	Oct. 22	Oct. 22
102	do.	39	SW.	do.	1904	10	Apr. 24	Apr. 19	Apr. 18	Apr. 6	July 15	Oct. 21	Oct. 21
102	do.	39	SW.	do.	1905	11	Apr. 24	Apr. 27	Apr. 18	Apr. 13	May 30	Sept. 17	Oct. 10
104	do.	700	E. N.	Light loam.	1906	10	Apr. 24	Apr. 27	Apr. 18	Apr. 6	July 15	Sept. 17	Oct. 10
105	do.	1,000	N. S.	Clay loam.	1907	14	Apr. 9	do.	Apr. 15	Mar. 26	Sept. 15	Sept. 30	Nov. 25
105	do.	1,000	S. E.	do.	1904	5	do.	do.	do.	Apr. 4	June 30	Sept. 20	Aug. 10
105	do.	1,000	S. E.	do.	1905	6	Apr. 25	Apr. 27	Mar. 9	Apr. 22	June 5	Aug. 10	Oct. 21
107	do.	700	S. E.	do.	1906	10	Apr. 18	Apr. 25	Apr. 15	Apr. 5	June 5	Aug. 10	Oct. 21

TABLE VII.—*Phenological records of apples—Continued.*  
MAIDEN BLUSH.

Ob- serv- er's No.	State.	Ap- proxi- mate lati- tude.	Eleva- tion.	Slope.	Soil.	Year.	Age of tree.	Date first bloom.	Date full bloom.	Date last spring frost.	Date leaf buds begin to open.	Date terminal buds begin to form.	Date picked buds (first picking).	Date first fall frost.	Date fit for use.	Keeps until—
14	Oklahoma.	35 15	<i>Fed.</i> 1,050	SE.	Clay loam.	1902	Yrs. 8	Apr. 11	Apr. 16	Mar. 29	Apr. 11	July 20	July 20	Oct. 6	Aug. 1	Nov.
17	do.	35 30	1,250	W.	Sandy loam.	1904	12	Apr. 20	Apr. 17	Apr. 5	Mar. 25	Apr. 15	Aug. 1	Oct. 11	Aug. 2	Nov.
22	do.	35 45	992	S.	do.	1905	10	Apr. 1	Apr. 19	Apr. 17	Mar. 26	June 1	Aug. 30	Nov. —	Aug. 2	Sept.
23	Arkansas.	36 0	1,850	Level.	Clay loam.	1904	8	Apr. 11	Apr. 10	Apr. 17	Mar. 26	June 1	Aug. 30	Nov. 11	July 30	Do.
23	do.	36 0	1,850	Level.	do.	1905	9	Apr. 4	Apr. 10	Early	Apr. 6	June 26	July 30	Oct. 15	Aug. 30	Do.
23	do.	36 0	1,850	Level.	do.	1906	10	Apr. 18	Apr. 23	Feb. 5	Apr. 10	June 24	Aug. 14	Oct. 15	Aug. 30	Do.
23	do.	36 0	1,850	Level.	do.	1907	11	Mar. 20	Mar. 23	Mar. 13	Apr. 10	June 20	Sept. 10	Oct. 15	Aug. 30	Do.
33	do.	36 15	1,300	W.	Clay loam.	1902	10	Apr. 4	Apr. 16	Mar. 23	Apr. 10	June 20	Sept. 10	Oct. 15	Aug. 30	Do.
46	Oklahoma.	36 15	1,300	W.	Sandy loam.	1906	10	Apr. 1	Apr. 16	Mar. 23	Apr. 10	June 20	Sept. 10	Oct. 15	Aug. 30	Do.
60	do.	36 30	1,400	W.	do.	1907	10	Mar. 24	Mar. 27	Apr. 29	Mar. 16	June 15	July 15	Nov. 11	July 1	Do.
71	Missouri.	37 0	1,250	N.	Clay.	1907	12	Mar. 24	Mar. 27	May 13	Mar. 16	June 15	July 15	Nov. 11	July 1	Do.
72	do.	37 0	1,300	N.	Clay loam.	1904	13	Apr. 14	Apr. 21	May 13	Mar. 16	June 15	July 15	Nov. 11	July 1	Do.
74	Oklahoma.	38 0	1,150	Level.	Light loam.	1905	12	Apr. 8	Apr. 19	Mar. 8	Apr. 2	June 9	Aug. 14	Oct. 23	Aug. 1	Aug. Sept.
83	Missouri.	38 0	1,150	N.	Clay.	1907	12	Mar. 18	Mar. 18	Mar. 17	Apr. 2	June 9	Aug. 14	Oct. 23	Aug. 1	Aug. Sept.
86	do.	38 0	1,000	E.	do.	1905	19	Apr. 9	Apr. 25	Apr. 14	Apr. 4	May 25	Aug. 13	Oct. 12	Aug. 4	Aug. Sept.
86	do.	38 0	1,000	E.	do.	1906	20	Apr. 20	Apr. 25	Apr. 14	Apr. 4	May 25	Aug. 13	Oct. 12	Aug. 4	Aug. Sept.
86	do.	38 0	1,000	E.	do.	1907	21	Apr. 22	May 3	Apr. 14	Apr. 4	May 25	Aug. 13	Oct. 12	Aug. 4	Aug. Sept.
97	do.	39 0	700	W.	do.	1902	6	Apr. 10	Apr. 12	May 1	do.	Sept. 18	Oct. 14	Oct. 10	Aug. 25	Aug. Sept.
97	do.	39 0	700	W.	do.	1903	7	Apr. 10	Apr. 12	May 1	do.	Sept. 18	Oct. 14	Oct. 10	Aug. 25	Aug. Sept.
97	do.	39 0	700	W.	do.	1904	8	Apr. 10	Apr. 12	May 1	do.	Sept. 18	Oct. 14	Oct. 10	Aug. 25	Aug. Sept.
97	do.	39 0	700	W.	do.	1905	9	Apr. 10	Apr. 12	May 1	do.	Sept. 18	Oct. 14	Oct. 10	Aug. 25	Aug. Sept.
97	do.	39 0	700	W.	do.	1906	10	Apr. 10	Apr. 12	May 1	do.	Sept. 18	Oct. 14	Oct. 10	Aug. 25	Aug. Sept.
97	do.	39 0	700	W.	do.	1907	11	Apr. 10	Apr. 12	May 1	do.	Sept. 18	Oct. 14	Oct. 10	Aug. 25	Aug. Sept.
97	do.	39 0	700	W.	do.	1908	12	Apr. 10	Apr. 12	May 1	do.	Sept. 18	Oct. 14	Oct. 10	Aug. 25	Aug. Sept.
98	do.	39 0	900	S.	Sandy clay.	1907	11	do.	do.	Apr. 29	Mar. 25	June 20	Sept. 9	Oct. 13	July 20	Oct.
106	do.	40 15	850	S. E.	Clay.	1902	6	Apr. 28	May 2	Apr. 22	Apr. 10	June 20	Sept. 9	Oct. 13	July 20	Oct.
106	do.	40 15	850	S. E.	do.	1903	7	Apr. 21	Apr. 25	Apr. 26	Apr. 10	June 20	Sept. 9	Oct. 13	July 20	Oct.
106	do.	40 15	850	S. E.	do.	1906	10	Apr. 27	May 3	May 9	Apr. 18	Aug. 23	Oct. 9	Oct. 9	July 20	Oct.

## OLDENBURG.

Ob- serv- er's No.	State.	Ap- proxi- mate lati- tude.	Eleva- tion.	Slope.	Soil.	Year.	Age of tree.	Date first bloom.	Date full bloom.	Date last spring frost.	Date leaf buds begin to open.	Date terminal buds begin to form.	Date picked buds (first picking).	Date first fall frost.	Date fit for use.	Keeps until—
4	Arkansas.	34 30	1,250	E.	Sandy loam.	1907	6	Mar. 20	Mar. 25	Mar. 2	Mar. 2	June 29	July 10	Nov. 10	July 25	July.
21	Oklahoma.	35 45	1,850	N.W.	do.	1903	11	Mar. 8	Apr. 12	Mar. 30	Mar. 27	June 29	July 10	Nov. 17	June 28	Aug.
23	do.	36 0	1,850	Level.	Clay loam.	1904	7	Apr. 4	do.	Early	Apr. 17	do.	Aug. 1	Nov. —	June 28	Aug.
23	Arkansas.	36 0	1,850	Level.	do.	1905	8	Mar. 30	Apr. 6	Early	Apr. 10	do.	Aug. 1	Nov. 11	July 10	Do.
23	do.	36 0	1,850	Level.	do.	1906	9	Apr. 12	Apr. 18	Feb. 5	Apr. 6	July 10	Aug. 6	Nov. 11	July 10	Do.
23	do.	36 0	1,850	Level.	do.	1907	10	Mar. 17	Mar. 23	Apr. 13	Mar. 15	June 24	Aug. 6	Nov. 11	July 10	Do.
23	do.	36 0	1,850	Level.	do.	1907	10	Apr. 1	Apr. 10	Apr. 13	Mar. 25	Aug. 1	July 16	Nov. 10	Aug. 1	Do.
23	do.	36 0	1,400	N.W.	Sandy loam.	1905	9	Apr. 1	Apr. 10	Apr. 5	Mar. 25	Aug. 1	July 16	Nov. 10	Aug. 1	Do.

44	Oklahoma	36	15	1,000	Level.	Sandy loam	1905	6	Apr.	7	Apr.	15	Mar.	28	Apr.	1	Oct.	28	Oct.	21	July.
35	Arkansas	36	30	1,300	E., W.	do.	1903	4	Apr.	6	Apr.	14	May	1	Mar.	12	Oct.	16	Nov.	16	July.
38	do	36	30	1,000	N.	Clay loam	1905	9	Mar.	30	Apr.	7	Apr.	22	Mar.	29	Oct.	11	Oct.	11	July.
73	Missouri	37	0	1,000	Level.	Light loam	1903	9	Apr.	6	Apr.	20	May	1	Apr.	5	June	3	Oct.	2	July.
74	Oklahoma	37	15	1,150	All.	Clay loam	1905	16	Apr.	4	Apr.	13	May	8	Apr.	20	June	3	Oct.	20	July.
78	Missouri	37	15	1,000	S., E.	Clay loam	1903	12	Apr.	4	Apr.	11	May	1	Apr.	21	June	25	Nov.	13	July.
92	do	38	30	550	S., E.	Sandy loam	1905	12	Apr.	4	Apr.	11	May	1	Apr.	8	Oct.	22	Oct.	22	July.
97	do	39	0	700	W.	Clay	1902	7	Apr.	21	May	1	Apr.	1	Apr.	1	Sept.	1	Oct.	18	July.
97	do	39	0	700	W.	do	1903	8	Apr.	10	May	12	May	1	Apr.	2	Sept.	1	Oct.	18	July.
97	do	39	0	700	W.	do	1904	9	Apr.	26	May	3	Apr.	25	Apr.	2	July	5	Oct.	23	July.
97	do	39	0	700	W.	do	1905	11	Apr.	5	Apr.	15	Apr.	18	Apr.	2	June	4	Oct.	23	July.
97	do	39	0	700	W.	do	1906	11	Apr.	29	Apr.	7	May	4	Apr.	17	June	10	Oct.	10	July.
97	do	39	0	700	W.	do	1907	12	Mar.	27	Apr.	7	do	15	Apr.	26	July	20	Oct.	12	July.
105	do	39	30	1,000	N., S.	Clay loam	1904	14	Apr.	10	Apr.	25	Apr.	4	Apr.	16	June	27	Nov.	1	July.
105	do	39	30	1,000	N., E.	do	1905	14	Apr.	22	Apr.	25	May	3	Mar.	21	June	25	Nov.	25	July.
105	do	39	30	1,000	S., E.	do	1906	16	Mar.	27	Apr.	24	May	9	Apr.	28	June	10	Oct.	10	July.
105	do	39	30	1,000	S., E.	do	1907	17	May	5	May	9	May	9	Apr.	28	June	10	Oct.	10	July.
106	do	40	15	850	S., E.	Clay	1904	8	Apr.	17	Apr.	28	May	22	Apr.	10	June	12	Oct.	10	July.
106	do	40	15	850	S., E.	do	1905	8	Apr.	24	May	1	May	9	Apr.	18	June	15	Oct.	10	July.
106	do	40	15	850	S., E.	do	1906	1	Apr.	24	May	1	May	9	Apr.	18	June	15	Oct.	10	July.
108	do	40	30	700	Level.	Clay loam	1903	1	Apr.	23	Apr.	27	May	3	Apr.	15	Sept.	5	Oct.	9	July.

## RED JUNE.

1	Arkansas	33	45	400	Level.	Sandy clay	1905	7	Mar.	25	Mar.	31	Mar.	21	Mar.	22	May	29	June	5	June.
11	do	35	15	500	N., S.	do	1905	6	Mar.	29	Apr.	4	Apr.	30	Mar.	22	May	29	June	5	Do.
21	Oklahoma	35	45	1,000	N.W.	Sandy loam	1903	10	Apr.	2	Apr.	6	Apr.	19	Apr.	19	June	15	June	20	Aug.
22	do	35	45	1,000	N.W.	do	1907	9	Apr.	20	Apr.	29	Apr.	26	Mar.	22	May	24	June	20	Aug.
22	do	35	45	902	S.	do	1904	10	Mar.	29	Apr.	4	Apr.	5	Mar.	25	June	20	June	20	Aug.
22	do	35	45	902	S.	do	1905	10	Mar.	29	Apr.	4	Apr.	5	Mar.	25	June	20	June	20	Aug.
23	Arkansas	36	0	1,850	Level.	Clay loam	1904	7	Apr.	8	Apr.	14	Early	17	Mar.	25	June	20	June	20	Aug.
23	do	36	0	1,850	Level.	do	1905	8	Apr.	2	Apr.	11	Early	17	Mar.	25	June	20	June	20	Aug.
23	do	36	0	1,850	Level.	do	1906	9	Apr.	19	Apr.	22	Feb.	5	Apr.	10	July	2	Aug.	2	Do.
23	do	36	0	1,850	Level.	do	1907	10	Mar.	22	Mar.	25	Apr.	13	Mar.	18	June	24	Aug.	2	Do.
28	Oklahoma	36	0	800	Level.	Sandy loam	1907	5	Mar.	18	Mar.	26	Feb.	10	Mar.	16	May	30	June	29	July.
88	Missouri	38	0	1,100	All.	do	1907	6	Mar.	25	Mar.	30	Apr.	23	Mar.	21	July	15	June	29	July.
96	do	38	45	850	S., E.	Clay	1907	6	Apr.	27	May	2	May	4	Apr.	19	June	10	July	10	July.
106	do	40	15	850	S., E.	do	1902	8	Apr.	27	May	2	May	4	Apr.	19	June	10	July	11	Aug.
106	do	40	15	850	S., E.	do	1904	10	Apr.	25	May	1	May	9	Apr.	18	Aug.	2	Aug.	2	Aug.

## STAYMAN WINESAP.

23	Arkansas	36	0	1,850	Level.	Clay loam	1905	10	Mar.	30	Apr.	4	Early	1	Apr.	10	Sept.	20	Oct.	20	Oct.
23	do	36	0	1,850	Level.	do	1906	11	Apr.	18	Apr.	22	Feb.	5	Apr.	13	Nov.	10	Dec.	10	Do.
23	do	36	0	1,850	Level.	do	1907	12	Mar.	20	Mar.	24	Apr.	13	Mar.	17	Aug.	7	Nov.	1	Do.
97	Missouri	39	0	700	W.	Clay	1902	5	Apr.	11	Apr.	14	May	1	Apr.	1	Sept.	18	Oct.	14	Do.
97	do	39	0	700	W.	do	1903	6	Apr.	11	Apr.	14	May	1	Apr.	2	Aug.	31	Oct.	14	Do.

TABLE VII.—*Phenological records of apples*—Continued.  
STAYMAN WINESAP—Continued.

Ob- serv- er's No.	State.	Ap- prox- imate lati- tude.	Eleva- tion.	Slope.	Soil.	Year.	Age of tree.	Date of first bloom.	Date full bloom.	Date last spring frost.	Date leaf buds begin to open.	Date terminal buds begin to form.	Date picked (first picking).	Date first fall frost.	Date fit for use.	Keeps until—
			<i>Feet.</i>				<i>Years.</i>									
97	Missouri	39 0	700	W.	Clay.	1904	7	Apr. 30	May 6	Apr. 25	Apr. 25	July 13	Sept. 15	Oct. 23		
97	do.	39 0	700	W.	do.	1905	8	Apr. 10	Apr. 21	Apr. 18	Apr. 9	June 9	Sept. 15	Oct. 21		
97	do.	39 0	700	W.	do.	1906	9	Apr. 21	Apr. 28	May 4	Apr. 20	June 30	Sept. 15	Oct. 10		
97	do.	39 0	700	W.	do.	1907	10	Mar. 28	Apr. 9	May 4	Mar. 26	July 15	Sept. 15	Oct. 12		
WINESAP.																
1	Arkansas.	33 45	400	Level.	Sandy clay.	1905	9	Mar. 25	Mar. 31	Mar. 2	Mar. 21		Sept. 1	Nov. 10	Oct. 11	Mar.
4	do.	34 30	1,250	E.	Sandy loam.	1907	10	Mar. 24	Mar. 29	Mar. 2	Apr. 10		Sept. 1	do.	Oct. 16	
5	do.	34 30	1,350	SE.	do.	1907	6	Mar. 25	Mar. 30	do.	Mar. 30		Oct. 15	Oct. 16	Oct. —	
7	do.	35 0	287	S.	do.	1903	12	Apr. 14	Apr. 19	Feb. 16	Mar. 4		Oct. 15	Nov. 23	Oct. —	
8	Oklahoma.	35 15	1,026	S.	Clay loam.	1906	4	Apr. 2	Apr. 6	Mar. 20	Mar. 28		Oct. 15	Nov. 3	Oct. —	
9	do.	35 15	1,200	W.	Sandy loam.	1905	9	Apr. 2	Apr. 6	Mar. 20	Mar. 28		Oct. 15	Nov. 3	Oct. —	
12	Arkansas.	35 15	260	SE.	do.	1904	14	Apr. 10	Apr. 16	Mar. 13	Apr. 4	Aug. 30	Sept. 20	Nov. 8	Sept. 15	Dec.
13	Oklahoma.	35 15	1,250	NE.	do.	1906	14	Apr. 10	Apr. 16	Mar. 13	Apr. 4	Aug. 30	Sept. 20	Nov. 8	Sept. 15	Dec.
13	do.	35 15	1,250	NE.	do.	1907	15	Apr. 12	Apr. 18	Feb. 16	Apr. 1	Aug. 15	Sept. 14	Nov. 26	Dec. —	May.
16	Arkansas.	35 30	1,100	W.	do.	1902	20	Apr. 12	Apr. 18	Feb. 16	Apr. 1	Aug. 15	Sept. 14	Nov. 26	Dec. —	May.
16	do.	35 30	1,100	W.	do.	1903	21	Mar. 28	Apr. 10	Mar. 30	Mar. 23	June 10	Sept. 15	Nov. 28	Dec. —	Feb.
16	do.	35 30	1,100	W.	do.	1905	23	do.	Apr. 6	Mar. 30	Mar. 23	June 10	Sept. 15	Nov. 28	Dec. —	Do.
16	do.	35 30	1,100	W.	do.	1906	24	Apr. 12	Apr. 23	Feb. 3	Mar. 15	Aug. 1	Sept. 20	Nov. 11	Oct. —	Jan.
17	Oklahoma	35 30	1,100	W.	do.	1907	25	Mar. 18	Mar. 28	Feb. 3	Mar. 15	Aug. 1	Sept. 20	Nov. 11	Oct. —	Apr.
21	Oklahoma	35 45	1,250	N.	do.	1903	12	Apr. 3	Apr. 7	Mar. 26	Apr. 1	Aug. 1	Oct. 1	Nov. 9	Dec. 1	Jan.
21	do.	35 45	1,000	NW.	do.	1904	10	Apr. 9	Apr. 13	Apr. 30	Apr. 1	Aug. 1	Oct. 1	Nov. 9	Dec. 1	Jan.
22	do.	35 45	1,000	NW.	do.	1907	14	Mar. 24	Apr. 7	Apr. 19	Apr. 1	Aug. 1	Oct. 1	Nov. 9	Dec. 1	Jan.
22	do.	35 45	992	S.	do.	1904	9	Apr. 20	Apr. 30	Apr. 26	Apr. 17	May 25	Oct. 3	Nov. 17	Dec. 1	Jan.
23	do.	35 45	992	S.	do.	1905	10	Apr. 3	Apr. 8	Apr. 26	Apr. 17	May 25	Oct. 3	Nov. 17	Dec. 1	Jan.
23	Arkansas.	36 0	1,850	Level.	Clay loam.	1904	9	Apr. 3	Apr. 8	Apr. 26	Apr. 17	May 25	Oct. 3	Nov. 17	Dec. 1	Jan.
24	do.	36 0	1,480	E.S.	Sandy loam.	1905	10	Apr. 3	Apr. 8	Apr. 26	Apr. 17	May 25	Oct. 3	Nov. 17	Dec. 1	Jan.
25	do.	36 0	1,400	NW.	do.	1907	18	Mar. 22	Mar. 26	Feb. 5	Mar. 17	Oct. 10	Sept. 20	Nov. 10	Winter.	Dec.
28	Oklahoma.	36 0	1,800	Level.	do.	1905	8	Apr. 5	Apr. 16	Apr. 5	Apr. 3	Aug. 5	Oct. 10	Nov. 10	Winter.	Dec.
29	Arkansas.	36 0	1,650	Level.	do.	1907	15	Apr. 3	Apr. 10	Feb. 10	Apr. 3	Aug. 5	Oct. 10	Nov. 10	Winter.	Dec.
31	Oklahoma.	36 15	1,900	E.	do.	1903	15	Apr. 12	Apr. 22	May 1	Apr. 7	June 8	Oct. 1	Sept. 27	Dec. 1	Apr.
32	Arkansas.	36 15	1,350	Level.	Clay loam.	1903	15	Apr. 12	Apr. 22	May 1	Apr. 7	June 8	Oct. 1	Sept. 27	Dec. 1	Apr.
33	do.	36 15	1,350	W.	do.	1904	8	Mar. 25	Apr. 7	Apr. 15	Apr. 10	June 20	Sept. 25	Oct. 20	Dec. —	Spring.
34	do.	36 15	1,400	S.	Clay	1907	16	Mar. 20	Mar. 25	May 14	Mar. 16	July 20	Oct. 15	Nov. 10	Dec. —	Spring.
35	do.	36 15	1,200	S.	Clay loam.	1907	16	Mar. 19	Mar. 25	May 15	Mar. 16	July 20	Oct. 15	Nov. 10	Dec. —	Spring.
36	do.	36 15	1,237	S.	Gravelly clay	1907	16	Mar. 26	Mar. 29	May 15	Mar. 16	July 20	Oct. 15	Nov. 10	Dec. —	Spring.

[illegible]

TABLE VII.—*Phenological records of apples*—Continued.  
WINESAP—Continued.

Or- serv- er's No.	State.	Ap- proxi- mate lati- tude.	Eleva- tion.	Slope.	Soil.	Year.	Age of tree.	Date first bloom.	Date full bloom.	Date last spring frost.	Date leaf buds begin to open.	Date terminal buds begin to form.	Date picked (first picking).	Date first fall frost.	Date fit for use.	Keeps until—
97	Missouri	39 0	700	W.	Clay	1906	Yrs. 10	Apr. 24	Apr. 29	May 9	Apr. 20	June 20	.....	Oct. 10	.....	.....
98	do.	39 0	700	W.	do.	1907	11	Mar. 28	Apr. 6	May 4	Mar. 27	July 11	.....	Oct. 12	.....	.....
99	do.	39 0	700	S.	Sandy clay	1907	11	Mar. 30	Apr. 22	May 4	Mar. 28	.....	.....	Oct. 17	.....	.....
101	do.	39 15	466	S.	Sandy loam	1907	5	Apr. 2	Apr. 8	May 2	Apr. 4	Sept. 15	.....	Oct. 25	.....	.....
103	do.	39 30	725	NW	Dark loam	1904	6	May 7	May 12	Apr. 12	May 13	Aug. 2	Nov. 10	Oct. 28	Dec. 10	May.
103	do.	39 30	725	NW	do.	1905	7	Apr. 17	May 5	Apr. 15	Apr. 18	do.	.....	Oct. 28	.....	.....
103	do.	39 30	725	NW	do.	1906	8	Apr. 29	May 5	May 4	Mar. 25	Aug. 10	Oct. 17	Oct. 13	Dec. 1	Mar.
103	do.	39 30	725	NW	do.	1907	9	Apr. 9	Apr. 24	May 4	Mar. 25	Sept. —	Oct. 15	Oct. 25	Sept. 1	Do.
104	do.	39 30	700	NW	Light loam	1907	10	Apr. 15	Apr. 28	Apr. 15	Apr. 30	June 30	Oct. 15	Oct. 10	Oct. 25	Do.
105	do.	39 30	1,000	N, S.	Clay loam	1905	11	Apr. 26	May 3	Apr. 13	Apr. 8	June 10	Oct. 15	Oct. 10	Oct. 25	Do.
106	do.	39 30	1,000	N, S.	do.	1906	11	Apr. 28	May 3	Apr. 13	Apr. 8	June 10	Oct. 15	Oct. 10	Oct. 25	Do.
107	do.	40 15	700	.....	.....	1905	10	Apr. 28	May 3	Apr. 13	Apr. 8	June 10	Oct. 15	Oct. 10	Oct. 25	Do.

## YELLOW TRANSPARENT.

4	Arkansas	34 30	1,250	E.	Sandy loam	1907	8	Mar. 23	Mar. 28	Mar. 2	Apr. 1	.....	June 25	Nov. 10	June 10	Aug.
5	do.	34 30	1,350	SE.	do.	1907	4	Mar. 25	Mar. 31	do.	Apr. 1	.....	June 15	do.	.....	.....
7	do.	35 0	287	S.	do.	1903	12	Apr. 4	Apr. 9	Feb. 16	Mar. 27	.....	June 8	Oct. 21	.....	.....
8	Oklahoma	35 15	1,025	S.	Clay loam	1905	4	Apr. 15	Apr. 20	Mar. 20	Mar. 25	.....	June 20	Oct. 10	June 15	.....
8	do.	35 15	1,025	S.	do.	1906	4	Apr. 15	Apr. 20	Mar. 20	Mar. 25	.....	June 20	Oct. 10	June 15	.....
9	do.	35 15	1,200	W.	Sandy loam	1905	4	Mar. 28	Apr. 2	Mar. 21	Mar. 25	.....	June 13	Nov. 23	June 5	July.
12	Arkansas	35 15	260	SE.	do.	1904	4	Mar. 29	Apr. 2	Mar. 30	Apr. 1	May 20	June 13	Nov. 17	June 5	.....
21	Oklahoma	35 45	1,000	NW	do.	1903	11	Mar. 29	Apr. 2	Mar. 30	Apr. 1	May 20	June 13	Nov. 17	June 5	.....
22	do.	35 45	992	S.	do.	1904	9	Apr. 10	Apr. 15	Apr. 26	Apr. 1	May 20	June 13	Nov. 17	June 5	.....
22	do.	35 45	992	S.	do.	1905	10	Apr. 10	Apr. 15	Apr. 26	Apr. 1	May 20	June 13	Nov. 17	June 5	.....
23	Arkansas	36 0	1,850	Level.	Clay loam	1904	7	Apr. 12	Apr. 16	Apr. 5	Mar. 25	Apr. 15	July 19	Oct. 11	June 20	July.
23	do.	36 0	1,850	Level.	do.	1905	8	Apr. 12	Apr. 16	Apr. 5	Mar. 25	Apr. 15	July 19	Oct. 11	June 20	Do.
23	do.	36 0	1,850	Level.	do.	1906	10	Apr. 17	Apr. 21	Early	Apr. 8	June 29	July 22	Nov. 31	June 14	.....
25	do.	36 0	1,400	NW	do.	1907	10	Mar. 23	Apr. 27	Feb. 5	Apr. 11	July 5	July 28	Nov. 11	June 14	.....
26	do.	36 0	1,450	SW	Sandy loam	1905	9	Apr. 1	Apr. 21	Apr. 13	Mar. 20	June 24	July 16	Nov. 10	Aug. 1	.....
26	do.	36 0	1,450	SW	do.	1906	9	Apr. 15	Apr. 21	May 9	Apr. 4	Aug. 1	July 16	Nov. 10	Aug. 1	.....
34	do.	36 15	1,400	S.	Clay	1907	16	Mar. 22	Mar. 28	May 14	Mar. 19	.....	.....	.....	.....	.....
42	Oklahoma	36 15	700	NW	Sandy loam	1907	5	Mar. 23	Mar. 28	May 14	Mar. 19	.....	.....	.....	June 15	July.
50	Arkansas	36 30	1,500	SW	Chert	1902	7	Apr. 17	Apr. 23	Mar. 31	Apr. 8	.....	June 8	Nov. 25	June 8	Do.
55	do.	36 30	1,300	E, W.	Sandy loam	1902	3	Apr. 16	Apr. 19	Mar. 19	Apr. 3	.....	July 1	Nov. 27	June 8	.....
55	do.	36 30	1,300	E, W.	do.	1903	4	Apr. 6	Apr. 14	May 1	Mar. 12	.....	.....	Nov. 16	June 8	.....



TABLE VIII.—*Phenological records of peaches.*

CHAMPION.

Ob- serv- er's No.	State.	Ap- proxi- mate lati- tude.	Eleva- tion.	Slope.	Soil.	Year.	Age of tree.	Date first bloom.	Date full bloom.	Date last spring frost.	Date leaf buds begin to open.	Date terminal buds begin to form.	Date first pick- ing.	Date last pick- ing.	Date first fall frost.
2	Arkansas.....	34 15	<i>Fed.</i> 900	S.	Sandy.....	1907	Yrs. 3	Mar. 7	Mar. 15	.....	Mar. 18	.....	.....	.....	.....
27	Oklahoma.....	36 0	1,300	N.W.	Clay loam.....	1902	4	Feb. 26	Mar. 8	Feb. 10	Mar. 10	.....	July 1	July 18	Nov. 1
28	do.....	36 0	800	Level.	Sandy loam.....	1907	4	Feb. 20	Mar. 1	Apr. 10	.....	.....	.....	.....	.....
38	do.....	36 15	1,250	Level.	do.....	1904	.....	.....	.....	.....	.....	.....	.....	.....	.....
46	Arkansas.....	36 15	1,250	S.	do.....	1906	3	Apr. 2	Apr. 8	May 3	Apr. 25	June —	Aug. 12	Aug. 18	Oct. 11
46	Oklahoma.....	36 15	1,100	W., E.	do.....	1907	4	Apr. 14	Apr. 22	Apr. 29	Mar. 18	Sept. 1	.....	.....	Nov. 11
46	do.....	36 15	1,100	W., E.	do.....	1907	4	Apr. 16	Apr. 22	May 1	Mar. 26	.....	.....	.....	Oct. 2
60	do.....	36 30	1,400	W.	do.....	1907	6	Mar. 31	Apr. 7	May 1	Mar. 26	.....	.....	.....	Oct. 3
73	Missouri.....	37 0	1,000	.....	do.....	1903	3	.....	Apr. 2	Mar. 2	Apr. 12	.....	.....	.....	Oct. 13
75	do.....	37 15	900	Level.	Black loam.....	1904	3	Apr. 8	Apr. 11	May 9	Apr. 20	.....	.....	.....	Oct. 23
75	do.....	35 15	900	Level.	do.....	1906	5	Mar. 18	Mar. 20	Apr. 17	Mar. 20	.....	.....	.....	Oct. 21
75	do.....	37 15	900	Level.	do.....	1907	12	Mar. 18	Mar. 20	Apr. 13	Apr. 14	Aug. 14	Aug. 24	Sept. 5	Oct. 21
79	do.....	37 15	1,300	Level.	do.....	1904	6	Apr. 25	May 1	Apr. 18	Apr. 15	Aug. 17	Aug. 12	Aug. 26	Oct. 12
97	do.....	39 0	700	S.	Clay.....	1905	7	Apr. 7	Apr. 20	May 9	Mar. 26	Aug. 30	Aug. 1	Aug. 20	Nov. 1
97	do.....	39 0	700	S.	do.....	1906	8	Apr. 13	Apr. 20	May 9	Mar. 26	Aug. 30	Aug. 10	Aug. 15	Oct. 25
97	do.....	39 0	700	S.	do.....	1907	9	Apr. 23	Mar. 27	May 4	Mar. 26	.....	.....	.....	Oct. 9
97	do.....	39 0	700	S.	do.....	1903	7	Apr. 16	Apr. 20	May 2	Mar. 26	Sept. 10	Aug. 21	Aug. 27	Oct. 9
99	do.....	39 15	800	E.W.	do.....	1907	7	Mar. 25	Mar. 29	May 2	Mar. 26	.....	.....	.....	Oct. 9
101	do.....	39 15	406	S.	Sandy loam.....	1907	5	Apr. 19	Apr. 22	May 9	Apr. 20	.....	.....	.....	Oct. 9
106	do.....	39 15	850	N., E.	Clay.....	1906	.....	.....	.....	.....	.....	.....	.....	.....	.....

## EARLY CRAWFORD.

Ob- serv- er's No.	State.	Ap- proxi- mate lati- tude.	Eleva- tion.	Slope.	Soil.	Year.	Age of tree.	Date first bloom.	Date full bloom.	Date last spring frost.	Date leaf buds begin to open.	Date terminal buds begin to form.	Date first pick- ing.	Date last pick- ing.	Date first fall frost.
1	Arkansas.....	33 45	400	Level.	Sandy clay.....	1905	3 to 4	Mar. 25	Mar. 24	Mar. 20	Mar. 22	.....	July —	July 31	Oct. 10
11	Oklahoma.....	35 15	1,026	S.	Clay loam.....	1906	6	Mar. 20	Apr. 23	Mar. 20	Mar. 3	.....	July 17	July 20	.....
18	Arkansas.....	35 15	500	N.S.	Sandy clay.....	1905	7	Mar. 30	Apr. 2	May 2	Apr. 6	.....	July 10	July 20	.....
14	Oklahoma.....	35 30	1,060	S.W.	Sandy loam.....	1903	4	Mar. 38	Mar. 25	Feb. —	Mar. 12	Aug. 15	July 10	July 25	Nov. 26
16	Arkansas.....	35 30	1,100	W.	do.....	1902	4	Mar. 20	Mar. 25	Mar. 26	Mar. 5	.....	.....	.....	Nov. 9
17	Oklahoma.....	35 30	1,250	W.	do.....	1904	9	Mar. 20	Mar. 15	do.....	Mar. 5	.....	.....	.....	Oct. 26
22	do.....	35 45	992	.....	do.....	1904	9	Mar. 23	Apr. 4	May 15	Mar. 14	July 20	July 15	Aug. 2	Nov. 10
27	do.....	36 0	1,300	N.W.	Clay loam.....	1902	8	Mar. 23	Apr. 11	May 15	Mar. 14	June 28	June 12	June 27	Oct. 19
35	Arkansas.....	36 15	1,200	N.	do.....	1907	8	Mar. 23	Apr. 4	May 15	Mar. 21	June 28	June 12	June 27	Oct. 19
37	do.....	36 15	1,200	W., S.	do.....	1907	8	Mar. 23	Apr. 4	May 15	Mar. 21	June 28	June 12	June 27	Oct. 19
40	do.....	36 15	1,300	W.	Gravel.....	1904	6	Mar. 18	Mar. 26	Apr. 13	Mar. 25	.....	July 26	Aug. 1	Nov. 14
51	do.....	36 30	1,300	N.	Clay loam.....	1904	8	Mar. 15	Mar. 21	Apr. 12	Mar. 25	.....	July 10	Aug. 15	Nov. 27
55	do.....	36 30	1,500	N.	Chert.....	1907	10	Apr. 3	Apr. 9	Mar. 19	Apr. 5	.....	Aug. 10	Aug. 30	Oct. 10
55	do.....	36 30	1,300	W.	Sandy loam.....	1902	5	Apr. 4	Apr. 10	Apr. 17	Apr. 5	.....	Aug. 10	Aug. 30	Oct. 10
56	do.....	36 30	925	N., E.	Chert.....	1906	5	Apr. 4	Apr. 10	Apr. 17	Apr. 5	.....	Aug. 10	Aug. 30	Oct. 10

62	Missouri.	1,200	N.	Black loam.	1904	7	Mar. 15	Mar. 20	Mar. 15	Mar. 14	June 6	July 25	Oct. 25
62	do.	36 30	N.	do.	1905	8	Mar. 10	do.	Mar. 20	Mar. 2	do.	.....	Oct. 25
63	do.	36 30		Sandy loam	1906	8	Mar. 31	Apr. 8	Apr. 1	Mar. 26	.....	.....	Oct. 2
73	do.	37 45	Level.	Gravel loam	1906	8	Apr. 10	Apr. 12	May 1	Apr. 14	.....	.....	Oct. 2
81	do.	38 15	N.	Sandy loam	1906	6	Mar. 19	Mar. 23	Apr. 25	Mar. 16	.....	.....	Oct. 12
91	do.	38 15	N.	do.	1907	7	Mar. 21	Mar. 24	Apr. 5	Apr. 1	Aug. 15	.....	Oct. 12
95	do.	38 45	N.	Light loam.	1904	9	Mar. 8	Apr. 17	Early	Mar. 25	.....	.....	Do.
95	do.	38 45	N.	do.	1905	10	Apr. 12	Apr. 15	Apr. 3	Apr. 5	June 20	Aug. 25	Oct. 15
95	do.	38 45	N.	do.	1906	11	Apr. 13	Apr. 19	May 2	Apr. 5	June 4	Aug. 20	Oct. 11
95	do.	38 45	N.	do.	1907	12	Apr. 25	Mar. 27	Apr. 18	Apr. 27	June 25	Aug. 25	Oct. 8
97	do.	39 0	N.	Clay.	1905	7	Apr. 12	Apr. 19	Apr. 14	Apr. 1	Aug. 10	.....	Oct. 20
97	do.	39 0	N.	do.	1906	8	Apr. 13	Apr. 19	May 9	Apr. 15	Aug. 6	.....	Oct. 21
97	do.	39 0	N.	do.	1907	9	Mar. 23	Mar. 29	May 4	Mar. 26	Sept. 3	.....	Oct. 12
101	do.	39 15	N.	Sandy loam	1907	7	Mar. 25	Mar. 29	May 2	Mar. 26	Aug. 10	.....	Oct. 25
103	do.	39 30	Level.	Black loam.	1906	3	Apr. 28	May 2	May 4	May 2	Aug. 1	.....	Oct. 1
103	do.	39 30	Level.	do.	1907	4	Mar. 26	Apr. 2	May 4	Mar. 24	July 28	.....	Oct. 13

ELBERTA.

1	Arkansas	400	Level.	Sandy clay.	1905	3 to 5	Mar. 20	Mar. 24	Mar. 22	July	.....	.....	Nov. 10
2	do.	34 15	S.	Sandy	1907	4	Mar. 5	Mar. 10	Mar. 15	July 14	.....	.....	Nov. 10
3	do.	34 15	E.	Clay loam	1907	4	Mar. 4	Mar. 11	Mar. 16	July 24	.....	.....	Do.
4	do.	34 30	N.W.	Sandy loam	1907	8	Mar. 3	Mar. 6	Mar. 6	July 20	.....	.....	Nov. 13
5	do.	34 30	N.W.	do.	1907	7	Mar. 10	Mar. 18	Mar. 16	July 25	.....	.....	Oct. 10
6	do.	34 45	W.	do.	1904	6	Mar. 6	Mar. 12	Mar. 3	.....	.....	.....	Nov. 8
8	Okahoma.	35 15	S.	Clay	1906	4	Mar. 25	Apr. 2	Mar. 12	Sept. 1	.....	.....	Oct. 6
11	Arkansas.	35 15	N.	Clay loam	1905	10	Mar. 19	Mar. 25	Mar. 3	.....	.....	.....	Nov. 10
13	Okahoma.	35 15	N.E.	Sandy clay.	1907	6	Mar. 1	Mar. 6	Mar. 12	July 30	.....	.....	Nov. 13
14	do.	35 15	N.W.	Sandy loam	1902	8	Mar. 30	Apr. 5	Apr. 6	Aug. 20	.....	.....	Nov. 8
14	do.	35 15	SW.	do.	1903	7	Mar. 30	Apr. 2	Apr. 7	Aug. 10	.....	.....	Oct. 6
15	Arkansas	35 30	S.	do.	1903	4	Mar. 8	Mar. 15	Mar. 20	July 20	.....	.....	Nov. 10
15	do.	35 30	S.	do.	1905	5	Mar. 14	Mar. 19	Mar. 22	July 30	.....	.....	Nov. 10
16	do.	35 30	W.	do.	1902	4	Mar. 22	Mar. 27	Mar. 8	Aug. 17	.....	.....	Nov. 26
16	do.	35 30	W.	do.	1903	5	Mar. 15	Mar. 23	Mar. 6	Aug. 5	.....	.....	Nov. 17
16	do.	35 30	W.	do.	1905	7	Mar. 14	Mar. 20	Mar. 3	Aug. 20	.....	.....	Nov. 17
16	do.	35 30	W.	do.	1906	8	Mar. 26	Mar. 6	Mar. 3	June 15	.....	.....	Nov. 13
16	do.	35 30	W.	do.	1907	9	Mar. 20	Mar. 16	Mar. 3	June 1	.....	.....	Nov. 13
17	Okahoma.	35 30	W.	do.	1904	6	Feb. 20	Mar. 16	Feb. 17	July 18	.....	.....	Nov. 11
18	do.	35 30	N.	do.	1907	6	Feb. 19	Mar. 3	Mar. 26	July 30	.....	.....	Nov. 9
19	Arkansas	35 30	N.W.	do.	1906	7	Feb. 1	Apr. 3	Mar. 4	July 15	.....	.....	Oct. 10
21	Okahoma.	35 45	N.W.	do.	1903	11	Mar. 27	Apr. 1	Mar. 24	July 25	.....	.....	Do.
22	do.	35 45	S.	do.	1904	9	Feb. 28	Mar. 9	Feb. 25	Aug. 19	.....	.....	Nov. 17
23	Arkansas	36 0	Level.	Clay loam	1905	8	Mar. 17	Mar. 21	Mar. 25	Aug. 22	.....	.....	Oct. 26
23	do.	36 0	Level.	do.	1906	10	Apr. 4	Apr. 9	Mar. 20	Sept. 10	.....	.....	Nov. 31
23	do.	36 0	Level.	do.	1907	11	Mar. 9	Mar. 14	Apr. 15	Aug. 3	.....	.....	Nov. 11
26	do.	36 0	SW.	Sandy loam.	1906	4	Apr. 9	Apr. 10	Apr. 4	Sept. 10	.....	.....	Oct. 15
26	do.	36 0	SW.	do.	1907	10	Mar. 14	Mar. 19	Mar. 19	Sept. 12	.....	.....	Oct. 15
26	do.	36 0	SW.	do.	1907	9	Mar. 27	Apr. 7	Mar. 19	.....	.....	.....	.....
27	Okahoma.	36 0	N.W.	Clay loam.	1902	9	Mar. 27	Apr. 7	Mar. 19	.....	.....	.....	.....

TABLE VIII.—*Phenological records of peaches*—Continued.

ELBERTA—Continued.

Ob- serv- er's No.	State.	Ap- prox- imate lati- tude.	Eleva- tion.	Slope.	Soil.	Year.	Age of tree.	Date first bloom.	Date full bloom.	Date last spring frost.	Date leaf buds begin to open.	Date terminal buds begin to form.	Date first picking.	Date last picking.	Date first fall frost.
28	Oklahoma.	36 0	Feet.	Level.	Sandy loam.	1907	Yrs.	Mar. 4	Mar. 16	Feb. 10	Mar. 15	.....	Aug. 4	Aug. 30	Nov. 1
29	Arkansas.	36 0	1,600	Level.	do.	1906	15	Apr. 18	Apr. 8	Mar. 22	Apr. 1	.....	Aug. 10	Aug. 20	Sept. 27
31	Oklahoma.	36 15	1,000	S. E.	do.	1903	3	Mar. 18	Mar. 28	May 1	Mar. 25	.....	Aug. 20	Aug. 20	Oct. 20
32	Arkansas.	36 15	1,350	Level.	Clay loam.	1904	6	Mar. 1	Mar. 15	Apr. 15	Mar. 15	June 20	Aug. 15	Aug. 25	Oct. 20
33	do.	36 15	1,300	W.	do.	1907	3	Mar. 7	Mar. 12	Apr. 12	Mar. 12	.....	Aug. 1	Aug. 15	Oct. 10
34	do.	36 15	1,400	S.	Clay	1906	15	Apr. 1	Apr. 15	May 14	Feb. 15	.....	Aug. 1	Aug. 15	Oct. 10
35	do.	36 15	1,400	S.	do.	1907	16	Mar. 1	Mar. 11	May 15	.....	.....	.....	.....	Oct. 10
37	do.	36 15	1,200	N. S.	Clay loam.	1907	8	Mar. 14	Mar. 11	May 15	Mar. 14	July 20	.....	Aug. 10	Nov. 10
38	do.	36 15	1,250	W.	Gravel.	1907	4	Mar. 16	Mar. 20	Apr. 10	Mar. 24	June 30	.....	.....	.....
38	do.	36 15	1,250	S.	Sandy loam.	1904	.....	Mar. 3	Mar. 7	May 11	Apr. 1	.....	.....	.....	.....
39	do.	36 15	1,265	S.	do.	1906	2	Apr. 3	Apr. 6	Mar. 20	Apr. 1	.....	.....	.....	.....
41	do.	36 15	1,265	S.	Gravel loam.	1902	6	Mar. 28	Apr. 9	Mar. 20	Apr. 4	.....	.....	.....	.....
43	do.	36 15	1,400	W.	Sandy loam.	1906	3	Apr. 4	Apr. 9	Mar. 20	Apr. 4	.....	.....	.....	.....
47	do.	36 15	1,385	W.	Chert.	1902	10	Mar. 28	Apr. 6	Mar. 30	Apr. 5	.....	.....	.....	.....
49	do.	36 30	1,500	E. W.	do.	1902	5	do	do	Mar. 31	Apr. 5	.....	.....	.....	.....
50	do.	36 30	1,500	SW.	do.	1902	3	do	do	do	Apr. 9	.....	.....	.....	.....
51	do.	36 30	1,500	N.	do.	1902	5	Apr. 4	Apr. 6	do	Apr. 9	.....	.....	.....	.....
53	do.	36 30	1,500	N.	do.	1907	8	Mar. 18	Mar. 22	Apr. 12	Mar. 26	.....	.....	.....	.....
55	do.	36 30	1,575	N.	do.	1902	4	Mar. 30	Mar. 31	Apr. 6	Apr. 6	.....	.....	.....	.....
56	do.	36 30	1,300	NE.	Sandy loam.	1906	10	Apr. 3	Apr. 9	Mar. 19	Apr. 5	.....	.....	.....	.....
60	Oklahoma.	36 30	925	NE.	Chert.	1906	5	Apr. 4	Apr. 10	Apr. 17	Apr. 17	.....	.....	.....	.....
62	Missouri.	36 30	1,400	W.	Black loam.	1907	4	Mar. 18	Mar. 20	Apr. 29	Mar. 22	Sept. 1	.....	.....	.....
62	do.	36 30	1,200	N.	Black loam.	1904	9	Mar. 15	Mar. 21	Apr. 15	Mar. 14	June 6	.....	.....	.....
63	do.	36 30	1,200	SW.	do.	1905	10	do	Mar. 30	Apr. 20	Mar. 14	June 4	.....	.....	.....
64	do.	36 30	1,250	SW.	Clay loam.	1902	5	Apr. 3	Apr. 12	Apr. 20	Apr. 4	do	.....	.....	.....
64	do.	36 45	900	All.	Chert.	1907	3	Mar. 5	Mar. 17	Apr. 13	Mar. 1	.....	.....	.....	.....
65	do.	36 45	950	All.	do.	1902	4	Apr. 5	Apr. 13	Apr. 8	Apr. 15	.....	.....	.....	.....
66	do.	36 45	1,482	SE.	Clay loam.	1907	7	Mar. 12	Mar. 18	Apr. 14	Mar. 15	.....	.....	.....	.....
67	do.	37 0	1,350	E. W.	Clay.	1907	4	Mar. 16	Mar. 21	Apr. 13	Mar. 20	Aug. 14	.....	.....	.....
68	do.	37 0	1,350	All.	Gravel loam.	1904	6	Mar. 4	Apr. 8	Apr. 13	Apr. 19	.....	.....	.....	.....
70	do.	37 0	1,650	NW.	Chert.	1907	8	Mar. 19	Apr. 24	Apr. 13	Apr. 19	.....	.....	.....	.....
73	do.	37 0	1,000	NW.	do.	1903	10	Mar. 31	Apr. 7	May 9	Mar. 26	.....	.....	.....	.....
75	do.	37 15	960	Level.	Black loam.	1906	5	Apr. 8	Apr. 11	May 17	Apr. 10	.....	.....	.....	.....
75	do.	37 15	960	Level.	do.	1906	6	Apr. 18	Mar. 20	Apr. 27	Apr. 20	.....	.....	.....	.....
77	do.	37 15	1,300	SW.	Clay loam.	1902	4	Apr. 18	Apr. 20	Apr. 27	Mar. 14	.....	.....	.....	.....
77	do.	37 15	1,300	SW.	do.	1904	6	do	do	Apr. 22	Mar. 14	.....	.....	.....	.....
77	do.	37 15	1,300	SW.	do.	1905	7	do	do	Apr. 22	Mar. 23	.....	.....	.....	.....

79	do.	Level.	Black loam.	1,300	15	37	1907	5	Mar. 18	Mar. 20	Apr. 13	Apr. 2	May 17	Aug. 13	Aug. 19	Oct. 20
80	do.	N.	Clay	650	37	15	1907	5	Mar. 17	Mar. 27	Apr. 17	Apr. 14	May 17	Aug. 13	Aug. 19	Oct. 20
81	do.	N.	Sandy loam.	820	37	15	1906	5	Apr. 10	Apr. 12	May 17	Apr. 14	May 17	Aug. 13	Aug. 19	Oct. 20
82	do.	N.W.	Clay	1,150	38	0	1907	5	Mar. 20	Mar. 23	Apr. 17	Apr. 14	May 17	Aug. 13	Aug. 19	Oct. 20
83	do.	N.	Gravel loam.	1,300	38	0	1906	8	Mar. 19	Mar. 22	Apr. 25	Mar. 17	May 17	Aug. 13	Aug. 19	Oct. 20
84	do.	N.	Clay	1,000	38	0	1906	8	Mar. 12	Mar. 30	Apr. 16	Mar. 17	May 17	Aug. 13	Aug. 19	Oct. 20
87	do.	N.	Gravel loam.	820	38	15	1907	9	Mar. 26	Mar. 30	May 12	Mar. 28	Aug. 1	Aug. 10	Sept. 1	Oct. 20
90	do.	N.	Sandy loam.	400	38	15	1906	6	Apr. 9	Apr. 15	May 5	Apr. 1	Aug. 1	Aug. 10	Sept. 1	Oct. 20
91	do.	N.	do.	400	38	15	1907	7	Mar. 21	Mar. 24	May 4	Mar. 25	Aug. 1	Aug. 10	Sept. 1	Oct. 20
92	do.	N.E.	do.	550	38	30	1905	12	Apr. 13	Apr. 16	Apr. 21	Apr. 3	Sept. 10	Aug. 8	Aug. 16	Oct. 22
92	do.	S.E.	do.	550	38	30	1906	13	Apr. 13	Apr. 16	Apr. 21	Apr. 13	Sept. 10	Aug. 17	Aug. 27	Oct. 11
92	do.	S.E.	do.	550	38	30	1907	14	Mar. 22	Mar. 25	Apr. 11	Mar. 26	Aug. 23	Aug. 20	Aug. 28	Oct. 15
93	do.	S.	Clay loam.	580	38	30	1904	4	Apr. 8	Apr. 17	Early	Mar. 28	June 20	Sept. 1	Sept. 5	Oct. 15
93	do.	S.	Light loam.	800	38	45	1904	7	Apr. 10	Apr. 12	May 2	Apr. 5	June 10	Sept. 1	Sept. 5	Oct. 11
95	do.	S.	do.	800	38	45	1905	8	Apr. 13	Apr. 19	May 2	Apr. 15	June 20	Aug. 25	Aug. 30	Oct. 8
95	do.	S.	do.	800	38	45	1906	6	Apr. 25	Apr. 29	Apr. 25	Apr. 4	Aug. 12	Sept. 14	Sept. 14	Oct. 21
97	do.	S.	Clay	700	39	0	1904	6	Apr. 12	Apr. 20	May 9	Mar. 30	Aug. 12	Aug. 24	Sept. 15	Oct. 12
97	do.	S.	do.	700	39	0	1905	7	Apr. 13	Mar. 27	May 9	Mar. 24	Aug. 12	Aug. 24	Sept. 15	Oct. 12
97	do.	S.	do.	700	39	0	1906	8	Apr. 23	Mar. 27	May 9	Mar. 24	Aug. 12	Aug. 24	Sept. 15	Oct. 12
99	do.	E.W.	do.	800	39	15	1907	8	Apr. 16	Apr. 20	May 9	Mar. 29	Sept. 10	Aug. 15	Sept. 1	Nov. 1
101	do.	S.	Sandy loam.	466	39	15	1905	7	Mar. 25	Mar. 29	May 2	Mar. 29	Sept. 10	Aug. 15	Sept. 1	Nov. 1
103	do.	Level.	Black loam.	850	39	30	1906	3	Apr. 26	May 1	May 9	May 5	Aug. 23	do.	Aug. 22	Oct. 25
103	do.	Level.	do.	850	39	30	1907	4	Mar. 26	Apr. 2	May 4	Mar. 24	July 28	do.	Aug. 22	Oct. 10
106	do.	N., E.	Clay	850	40	15	1906	10	Apr. 20	Apr. 24	May 9	Apr. 24	Sept. 5	Sept. 5	Sept. 5	Oct. 13

## FAMILY FAVORITE.

14	Oklahoma.	SW.	Clay loam.	1,050	15	35	1902	7	Mar. 6	Apr. 6	Mar. 29	Apr. 8	June 1	July 25	Aug. 4	Oct. 6
20	Arkansas.	E.	Sandy loam.	1,400	36	0	1905	10	Mar. 6	Apr. 10	Mar. 15	Mar. 25	June 1	July 29	Aug. 10	Oct. 26
26	do.	SW.	do.	1,450	36	0	1906	10	Mar. 26	Apr. 10	May 9	Apr. 2	June 1	July 29	Aug. 10	Oct. 26
63	Oklahoma.	N.W.	Clay loam.	1,300	36	0	1902	4	Apr. 1	Apr. 9	Mar. 13	Mar. 29	June 1	July 22	Aug. 2	Oct. 17
27	Missouri.	SW.	do.	1,250	36	30	1907	7	Mar. 16	Apr. 1	Apr. 2	Mar. 20	June 1	July 22	Aug. 2	Oct. 17
67	do.	E.W.	Clay	1,350	37	0	1904	3	Mar. 16	Apr. 1	Apr. 2	Mar. 20	June 1	July 22	Aug. 2	Oct. 17
75	do.	Level.	Black loam.	900	37	15	1906	5	Mar. 16	Apr. 1	Apr. 2	Mar. 20	June 1	July 22	Aug. 2	Oct. 17
75	do.	Level.	do.	900	37	15	1907	6	Mar. 16	Apr. 1	Apr. 2	Mar. 20	June 1	July 22	Aug. 2	Oct. 17
75	do.	Level.	do.	900	37	15	1907	6	Mar. 16	Apr. 1	Apr. 2	Mar. 20	June 1	July 22	Aug. 2	Oct. 17
97	do.	S.	Clay	700	39	0	1904	10	Apr. 25	May 1	Apr. 25	Apr. 4	Aug. 29	Aug. 20	Aug. 30	Oct. 23
97	do.	S.	do.	700	39	0	1905	11	Apr. 9	May 1	Apr. 18	Mar. 30	Aug. 12	Aug. 15	Aug. 20	Oct. 21
97	do.	S.	do.	700	39	0	1906	11	Apr. 12	May 1	May 9	Mar. 30	Aug. 12	Aug. 15	Aug. 20	Oct. 21
97	do.	S.	do.	700	39	0	1907	13	Mar. 23	Mar. 27	May 4	Mar. 25	Sept. 3	Sept. 5	Sept. 5	Oct. 12

1 Winterkilled.

TABLE VIII.—*Phenological records of peaches—Continued.*  
HEATH (*Heath Cling*).

Ob- serv- er's No.	State.	Ap- proxi- mate lati- tude.	Eleva- tion.	Slope.	Soil.	Year.	Age of tree.	Date first bloom.	Date full bloom.	Date last spring frost.	Date leaf buds begin to open.	Date terminal buds begin to form.	Date first pick- ing.	Date last pick- ing.	Date first fall frost.
1	Arkansas.	33 45	Feet.	Level.	Sandy clay.	1905	Yrs.	Mar. 22	Mar. 26	Feb. 26	Mar. 22	Aug. 15	Aug. —	Sept. 15	Nov. 26
16	do.	35 30	1,100	W.	Sandy loam.	1902	4	Mar. 24	Mar. 30	Apr. 3	Mar. 12	Aug. 15	Aug. 20	Sept. 25	Nov. 17
16	do.	35 30	1,100	W.	do.	1903	5	Mar. 18	Mar. 25	Mar. 3	Mar. 14	June 15	Sept. 15	Sept. 25	Nov. 28
16	do.	35 30	1,100	W.	do.	1903	7	Mar. 15	do.	do.	Mar. 10	do.	Aug. 20	Aug. 29	Nov. 13
16	do.	35 30	1,100	W.	do.	1906	8	Apr. 1	Apr. 6	do.	do.	June 1	Aug. 20	Aug. 29	Nov. 13
17	do.	35 30	1,100	W.	do.	1907	9	Feb. 26	Mar. 18	Feb. 3	Feb. 19	Aug. 25	Aug. 30	Sept. 10	Nov. 9
16	Oklahoma.	35 30	1,250	W.	do.	1904	9	Mar. 7	Mar. 10	do.	Mar. 26	Aug. 1	Aug. 30	Sept. 10	Nov. 9
22	do.	35 45	992	S.	do.	1907	9	Mar. 7	Mar. 10	do.	Mar. 15	do.	do.	do.	Oct. 26
26	Arkansas.	36 0	1,450	SW.	do.	1904	9	Mar. 14	Mar. 19	do.	Mar. 15	do.	do.	do.	do.
27	Oklahoma.	36 0	1,300	NW.	Clay loam.	1902	9	Mar. 27	Apr. 5	May 1	Mar. 23	June 10	do.	do.	do.
31	do.	36 15	1,000	S. E.	Sandy loam.	1903	3	Mar. 20	Mar. 14	do.	do.	do.	do.	do.	do.
33	Arkansas.	36 15	1,300	W.	Clay loam.	1907	7	Mar. 8	Mar. 10	do.	Apr. 6	July 7	Sept. 8	Sept. 16	do.
41	do.	36 15	1,400	W.	Sandy loam.	1906	3	Apr. 4	Apr. 10	do.	do.	do.	do.	do.	do.
46	Oklahoma.	36 15	1,100	W., E.	do.	1906	3	Apr. 4	Apr. 8	May 3	Apr. 25	June —	Aug. 25	Sept. 15	Oct. 11
46	do.	36 15	1,100	W., E.	do.	1907	4	Apr. 16	Apr. 24	May 31	Mar. 14	June 6	Aug. 25	Sept. 15	Nov. 26
50	Arkansas.	36 30	1,500	SW.	Chert.	1902	9	Mar. 15	Mar. 10	Mar. 15	Mar. 14	June 6	Oct. 20	Oct. 25	Oct. 25
62	Missouri.	36 30	1,200	N.	Black loam.	1904	3	Mar. 17	Mar. 20	Mar. 30	Mar. 6	do.	Oct. 17	Oct. 20	Oct. 17
62	do.	36 30	1,200	N.	do.	1905	10	do.	Mar. 22	Apr. 13	Mar. 21	Aug. 14	Sept. 17	Sept. 24	Oct. 28
67	do.	37 0	1,350	E., W.	Clay.	1907	8	do.	Apr. 5	do.	Apr. 8	do.	do.	do.	Oct. 2
68	do.	37 0	1,350	All.	Gravel loam.	1904	6	Mar. 31	Apr. 10	May 1	Apr. 26	do.	do.	do.	Oct. 2
73	do.	37 0	1,000	do.	do.	1903	10	Apr. 12	Apr. 18	May 8	Apr. 14	do.	do.	do.	Oct. 10
81	do.	37 45	820	Level.	Sandy loam.	1906	8	Apr. 12	Apr. 18	May 8	Apr. 14	do.	Sept. 25	Oct. 15	Oct. 20
87	do.	38 0	1,000	Level.	Clay.	1906	8	Apr. 12	Apr. 18	May 8	Apr. 14	do.	do.	do.	Do.
91	do.	38 15	400	N.	Sandy loam.	1907	6	Apr. 21	Mar. 24	May 4	Mar. 25	Aug. 15	Sept. 25	Oct. 15	Oct. 20
92	do.	38 30	550	SE.	do.	1903	12	Apr. 4	Apr. 17	Apr. 21	Apr. 3	Sept. 10	Sept. 14	Sept. 24	Oct. 22
92	do.	38 30	550	SE.	do.	1906	13	Apr. 15	Apr. 25	Apr. 10	Apr. 13	Sept. 4	Sept. 25	Oct. 1	Oct. 11
92	do.	38 30	550	SE.	do.	1907	14	Mar. 23	Mar. 25	Apr. 11	Mar. 27	Aug. 30	Sept. 25	Oct. 15	Oct. 15
95	do.	38 45	800	S.	Light loam.	1904	10	do.	Apr. 17	Early	Apr. 8	June 10	Sept. 15	Sept. 20	Do.
95	do.	38 45	800	S.	do.	1905	11	do.	Apr. 17	Early	Apr. 3	June 10	do.	do.	Oct. 11
95	do.	38 45	800	S.	do.	1906	12	Apr. 15	Apr. 22	May 2	Apr. 20	June 25	Sept. 25	Sept. 30	Oct. 8
95	do.	38 45	800	S.	do.	1907	13	Mar. 27	Apr. 22	May 2	Apr. 29	June 25	Sept. 25	Sept. 30	Oct. 20
97	do.	39 0	700	S.	Clay.	1904	6	Apr. 25	Apr. 30	Apr. 25	Apr. 7	Aug. 10	Sept. 25	Oct. 3	Oct. 23
97	do.	39 0	700	S.	do.	1905	7	Apr. 7	Apr. 17	Apr. 17	Apr. 31	Aug. 10	Sept. 11	Oct. 3	Oct. 21
97	do.	39 0	700	S.	do.	1906	8	Apr. 13	Apr. 19	May 9	Apr. 15	Aug. 7	Sept. 11	Oct. 3	Oct. 10
97	do.	39 0	700	S.	do.	1907	9	Mar. 24	Mar. 27	May 4	Mar. 26	Aug. 30	Sept. 11	Oct. 3	Oct. 12
99	do.	39 15	800	E., W.	do.	1907	3	Apr. 25	Apr. 30	May 9	Mar. 26	Aug. 30	Sept. 20	Oct. 1	Nov. 1
101	do.	39 15	466	S.	Sandy loam.	1906	9	Mar. 25	Mar. 29	May 2	Mar. 29	Sept. 10	Sept. 23	Sept. 30	Oct. 25

5	Arkansas.	34	30	1,350	N.W.	Sandy loam.	1907	Mar. 10	Mar. 20	Mar. 2	Mar. 20	May	July 15	July 21	Nov. 10
14	Oklahoma.	35	15	1,050	S.W.	do.	1903	3	Mar. 30	May 2	Apr. 6	May	July 15	July 21	Nov. 10
26	Arkansas.	36	0	1,450	S.W.	do.	1906	6	Apr. 16	May 9	do.	May	July 15	July 21	Nov. 10
27	Oklahoma.	36	0	1,300	N.W.	Clay loam.	1902	8	Mar. 26	Apr. 4	do.	May	July 15	July 21	Nov. 10
61	Missouri.	36	30	950	N.E.	do.	1903	6	Apr. 3	May 1	Apr. 2	July 28	July 17	July 22	Oct. 16
63	do.	36	30	1,250	S.W.	do.	1902	4	Apr. 3	Apr. 10	Apr. 1	do.	July 17	July 22	Oct. 16

## OLDMIXON FREE.

8	Oklahoma.	35	15	1,026	S.	Clay loam.	1906	Mar. 20	Mar. 20	Mar. 3	Mar. 3	Mar. 20	July 15	July 25	Oct. 10
11	Arkansas.	35	15	500	N. S.	Sandy clay.	1905	6	Mar. 20	Mar. 10	Mar. 10	June 20	July 15	July 25	Nov. 17
22	do.	35	30	1,100	W.	Sandy loam.	1903	22	Mar. 16	Mar. 26	Mar. 5	do.	July 15	July 25	Oct. 26
16	Oklahoma.	35	45	992	S.	do.	1904	9	Mar. 9	Apr. 6	Apr. 6	do.	July 15	July 25	Oct. 26
26	Arkansas.	36	0	1,450	S.W.	do.	1907	9	Mar. 14	Mar. 20	Mar. 14	do.	July 15	July 25	Oct. 26
26	do.	36	0	1,450	S.W.	do.	1907	9	Mar. 26	Apr. 5	Mar. 14	do.	July 15	July 25	Oct. 26
27	Oklahoma.	36	0	1,300	N.W.	Clay loam.	1902	10	Mar. 26	Apr. 12	Mar. 14	do.	July 15	July 25	Oct. 26
33	Arkansas.	36	15	1,200	N.	do.	1907	10	Mar. 8	Mar. 20	Mar. 14	do.	July 15	July 25	Oct. 26
62	Missouri.	36	30	1,200	N.	Black loam.	1904	6	Mar. 15	Mar. 20	Mar. 14	do.	July 15	July 25	Oct. 26
62	do.	36	30	1,200	N.	do.	1905	7	Mar. 15	Mar. 20	Mar. 14	do.	July 15	July 25	Oct. 26
85	do.	38	0	950	W.	Clay loam.	1907	7	Mar. 18	Mar. 20	Mar. 14	do.	July 15	July 25	Oct. 26
92	do.	38	30	550	S.E.	Sandy loam.	1906	13	Apr. 13	Apr. 16	Apr. 13	Sept. 1	Aug. 12	Aug. 19	Oct. 11
92	do.	38	30	550	S.E.	do.	1907	14	Apr. 23	Apr. 25	Mar. 26	Sept. 1	Aug. 12	Aug. 19	Oct. 11
95	do.	38	45	800	S.	Light loam.	1904	9	Apr. 8	Apr. 17	Apr. 5	June 15	Aug. 15	Aug. 25	Do.
95	do.	38	45	800	S.	do.	1905	10	Apr. 12	Apr. 15	Apr. 5	June 15	Aug. 15	Aug. 20	Oct. 11
95	do.	38	45	800	S.	do.	1906	11	Apr. 13	Apr. 19	Mar. 26	June 20	Aug. 15	Aug. 20	Oct. 8
95	do.	38	45	800	S.	do.	1907	12	Apr. 25	Mar. 27	Mar. 26	June 20	Aug. 15	Aug. 20	Oct. 8
95	do.	38	45	800	S.	do.	1907	12	Apr. 25	Mar. 27	Mar. 26	June 20	Aug. 15	Aug. 20	Oct. 8
97	do.	39	0	700	S.	Clay.	1904	6	Apr. 23	Apr. 28	Apr. 25	Aug. 18	Sept. 10	Sept. 16	Oct. 23
97	do.	39	0	700	S.	do.	1905	7	Apr. 12	Apr. 18	Mar. 31	Aug. 29	Sept. 10	Sept. 16	Oct. 23
97	do.	39	0	700	S.	do.	1906	8	Apr. 23	Apr. 9	Mar. 31	Aug. 29	Sept. 10	Sept. 16	Oct. 23
97	do.	39	0	700	S.	do.	1907	9	Mar. 23	Mar. 27	Mar. 25	Aug. 20	Sept. 4	Sept. 4	Oct. 12
99	do.	39	15	800	E. W.	do.	1906	8	Apr. 18	Apr. 22	Mar. 25	Aug. 30	Sept. 4	Sept. 4	Oct. 12

## SALWAY.

16	Arkansas.	35	30	1,100	W.	Sandy loam.	1902	Mar. 26	Apr. 5	Feb. 30	Apr. 1	Aug. 15	Sept. 15	Nov. 26
16	do.	35	30	1,100	W.	do.	1903	5	Mar. 25	Apr. 30	Mar. 10	Aug. 15	Sept. 15	Nov. 26
16	do.	35	30	1,100	W.	do.	1905	7	Mar. 30	Mar. 3	Mar. 14	do.	Sept. 15	Nov. 26
23	do.	36	0	1,850	Level.	Clay loam.	1904	8	Mar. 23	Mar. 3	Mar. 28	do.	Sept. 15	Nov. 28
23	do.	36	0	1,850	Level.	do.	1906	10	Apr. 17	Mar. 17	Apr. 17	do.	Sept. 15	Nov. 28
23	do.	36	0	1,850	Level.	do.	1907	11	Apr. 11	Feb. 5	Apr. 17	do.	Sept. 15	Nov. 28
26	do.	36	0	1,450	S.W.	Sandy loam.	1906	8	Apr. 6	Mar. 13	Mar. 20	July 3	Oct. 5	Oct. 11
35	do.	36	15	1,200	N.	Clay loam.	1907	8	Apr. 12	Apr. 9	Apr. 8	July 30	Sept. 25	Nov. 10
41	do.	36	15	1,400	W.	Sandy loam.	1906	3	Apr. 6	Mar. 17	Apr. 19	July 14	Sept. 8	Nov. 10
51	do.	36	30	1,500	N.	Chert.	1907	6	Mar. 12	Apr. 10	Mar. 7	Aug. 27	Sept. 3	Oct. 14

TABLE VIII.—*Phenological records of peaches*—Continued.

SALWAY—Continued.

Ob- serv- er's No.	State.	Ap- proxi- mate lati- tude.	Eleva- tion.	Slope.	Soil.	Year.	Age of tree.	Date first bloom.	Date full bloom.	Date last spring frost.	Date leaf buds begin to open.	Date terminal buds begin to form.	Date first pick- ing.	Date last pick- ing.	Date first fall frost.
63	Missouri	36 30	1,250	SW.	Clay loam.	1902	Yrs.	Apr. 8	Apr. 14	Apr. 8	Apr. 7	July 10	Aug. 28	Sept. 8	Nov. 21
65	do.	36 30	1,350		Chert.	1902	4	Apr. 7	Apr. 13	Apr. 13	Apr. 13	Sept. 10	Sept. 20	Oct. 7	Nov. 21
68	do.	37 0	1,350		Gravel loam	1904	6	Apr. 6	Apr. 10	Apr. 10	Apr. 8	Sept. 17	Sept. 20	Oct. 28	Oct. 28
84	do.	38 0	1,300	N.	do.	1907	3	Mar. 21	Mar. 25	Mar. 25	Mar. 19	June 16	Oct. 5	Oct. 23	Oct. 23
83	do.	38 30	580	S.	Clay loam.	1904	10	Apr. 28	May 2	May 2	Apr. 2	Sept. 23	Sept. 20	Oct. 15	Oct. 15
95	do.	38 45	800	S.	Light loam.	1904	10	Apr. 12	Apr. 15	Apr. 15	Mar. 31	Sept. 23	Oct. 5	Oct. 21	Oct. 21
97	do.	39 0	700	S.	Clay	1905	7	Apr. 8	Mar. 27	Apr. 18	Mar. 26	Sept. 5	Oct. 1	Oct. 12	Oct. 12
97	do.	39 0	700	S.	do.	1907	9	Mar. 24	Apr. 30	May 4	Mar. 26	Sept. 5	Oct. 1	Oct. 10	Nov. 1
99	do.	39 15	800	E., W.	do.	1906	8	Apr. 25	Apr. 30	May 9	Mar. 26	Sept. 5	Oct. 1	Oct. 10	Nov. 1

SMOCK.

17	Oklahoma.	35 30	1,250	W.	Sandy loam.	1904	Mar. 20	Mar. 26	Apr. 1	Apr. 10	Apr. 8	Sept. 1	Sept. 3	Sept. 9	Nov. 9
38	Arkansas	36 15	1,250	S.	do.	1904	do.	Apr. 10	Apr. 8	Mar. 20	Apr. 8	Apr. 3	Sept. 3	Sept. 9	Nov. 23
39	do.	36 15	1,265	S.	Gravel loam.	1902	3	Apr. 3	Apr. 7	Mar. 20	Apr. 27	June 6	Oct. 11	Oct. 20	Oct. 11
46	Oklahoma.	36 15	1,100	W., E.	Sandy loam.	1906	4	Apr. 15	Mar. 30	May 3	Apr. 4	June 6	Aug. 15	Aug. 28	Oct. 11
45	do.	36 30	1,200	N.	do.	1907	9	Mar. 15	Mar. 30	Apr. 20	Apr. 4	June 6	Aug. 15	Aug. 28	Oct. 11
62	Missouri.	36 30	1,200	N.	Black loam.	1905	4	Apr. 15	Mar. 30	Apr. 20	Apr. 4	June 6	Aug. 15	Aug. 28	Oct. 11
63	do.	36 30	1,250	SW.	Clay loam.	1902	5	Apr. 7	Apr. 14	May 8	Apr. 14	Sept. 1	Sept. 20	Sept. 25	Oct. 11
81	do.	37 45	820	Level.	Sandy loam.	1906	13	Apr. 10	Apr. 12	May 8	Apr. 14	Sept. 1	Sept. 20	Sept. 25	Oct. 11
92	do.	38 30	550	SE.	do.	1906	14	Mar. 22	Mar. 25	Apr. 11	Mar. 26	Aug. 30	Sept. 1	Sept. 5	Do.
92	do.	38 30	550	SE.	do.	1907	10	Apr. 13	Apr. 16	Apr. 10	Apr. 13	June 10	Sept. 15	Sept. 25	Oct. 11
95	do.	38 45	800	S.	Light loam.	1904	10	Apr. 12	Apr. 14	Apr. 3	Apr. 8	June 10	Sept. 15	Sept. 25	Oct. 11
95	do.	38 45	800	S.	do.	1905	11	Apr. 12	Apr. 20	May 2	Apr. 20	June 15	Aug. 30	Sept. 15	Oct. 8
97	do.	38 45	800	S.	do.	1906	12	Apr. 25	Apr. 30	May 2	Apr. 25	Aug. 20	Sept. 28	Sept. 28	Oct. 23
97	do.	39 0	700	S.	Clay	1904	6	Apr. 25	Apr. 30	May 18	Apr. 10	July 25	Sept. 25	Nov. 5	Oct. 21
97	do.	39 0	700	S.	do.	1905	7	Apr. 1	Apr. 20	May 9	Mar. 26	Aug. 28	Sept. 25	Nov. 5	Oct. 10
97	do.	39 0	700	S.	do.	1906	8	Apr. 13	Apr. 20	May 4	Mar. 26	Aug. 28	Sept. 25	Nov. 5	Oct. 12
97	do.	39 0	700	S.	do.	1907	9	Mar. 23	Mar. 27	May 4	Mar. 26	Aug. 28	Sept. 25	Nov. 5	Oct. 12
99	do.	39 15	800	E., W.	do.	1906	3	Apr. 20	Apr. 25	May 9	Mar. 26	Aug. 28	Sept. 25	Nov. 5	Nov. 1



## DESCRIPTION OF PLATES.

PLATE I. Sketch map of the Ozark region. The counties in Missouri, Arkansas, and Oklahoma which comprise the principal portion of the Ozark uplift are indicated. The 500-foot contour lines are given; also the location of a number of the more important towns.

PLATE II. Trees of the Ada Red apple in northwestern Arkansas. Fig. 1.—The original tree of the variety, photographed July 26, 1907. The tree has constantly been in a much-neglected condition, hence its relatively small size. Fig. 2.—A tree about 5 years of age, showing the tendency to an upright habit of growth. Trees of the same variety at about the age of 10 years that had produced considerable fruit had become more spreading.

PLATE III. Trees of the Arkansas apple in northwestern Arkansas. Fig. 1.—The original tree of the variety, photographed August 25, 1906. The tree was then about 75 years old and measured approximately 8 feet in circumference at about 2 feet from the ground; the topmost branches were dead and the main limbs had been broken off. This tree is illustrated in Bulletin 49 of the Arkansas Agricultural Experiment Station from a photograph taken in the fall of 1897. It showed no dead limbs at that time and was apparently in good condition. Fig. 2.—A well-pruned tree at the age of 10 years, showing the symmetrical and vigorous habit of growth.

PLATE IV. Trees of the Collins apple in northwestern Arkansas. Fig. 1.—The original tree of the variety, photographed August 24, 1906. The tree was then about 40 years old. For many years it stood in an open field and was given little or no attention. A young orchard now surrounds it. Fig. 2.—A tree at about 12 years of age, showing the habit of growth when proper pruning has been neglected.

PLATE V. Orchards in the Ozark region. Fig. 1.—A block of 5-year-old trees of the Gano apple. These trees are headed higher than is usual in orchards in this region. The central leader was removed when the trees were planted, and the heads grew from a relatively small number of limbs—usually 4 to 6. (Compare fig. 6, p. 57.) Fig. 2.—A young peach orchard interplanted with strawberries, illustrating a common practice in the sections in which strawberries are extensively grown, during the years when an orchard is coming into bearing.

PLATE VI. A peach orchard of the Elberta variety near Van Buren, Ark., photographed July 24, 1907. This orchard is typical of the better kept ones in this section. Normally the foliage would be more dense, but in this case it had been injured considerably by a spray mixture.

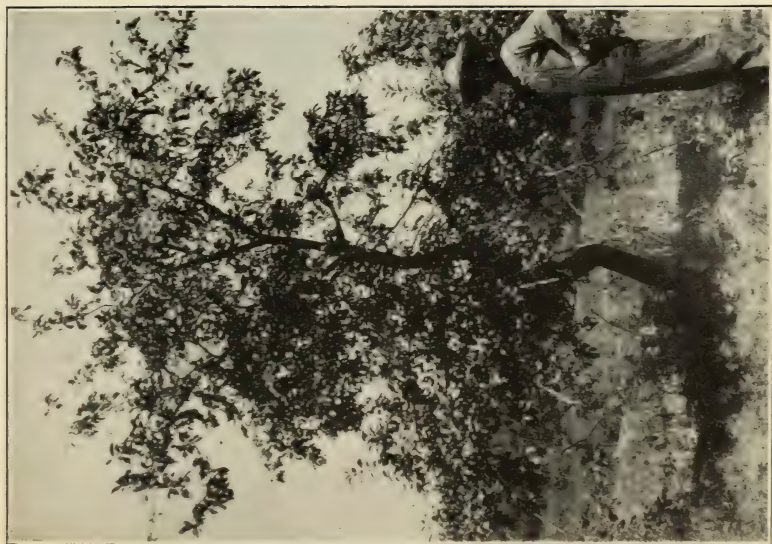


FIG. 1.—THE ORIGINAL TREE OF THE VARIETY,  
JULY 26, 1907.



FIG. 2.—A TREE ABOUT 5 YEARS OF AGE.

TREES OF THE ADA RED APPLE IN NORTHWESTERN ARKANSAS.



FIG. 1.—THE ORIGINAL TREE OF THE VARIETY,  
AUGUST 25, 1906.



FIG. 2.—A WELL-PRUNED TREE AT THE AGE OF 10 YEARS.

TREES OF THE ARKANSAS APPLE IN NORTHWESTERN ARKANSAS.

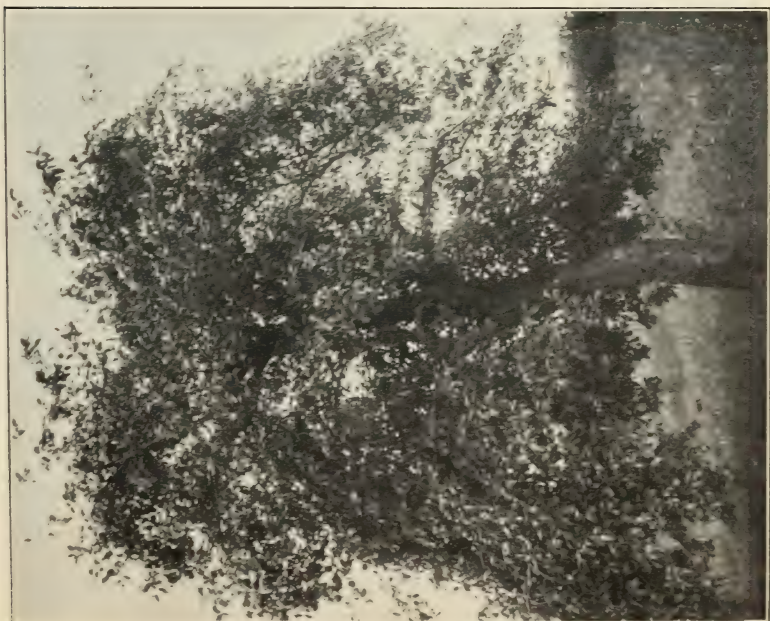


FIG. 1.—THE ORIGINAL TREE OF THE VARIETY, AUGUST 24, 1906.



FIG. 2.—A TREE ABOUT 12 YEARS OF AGE.

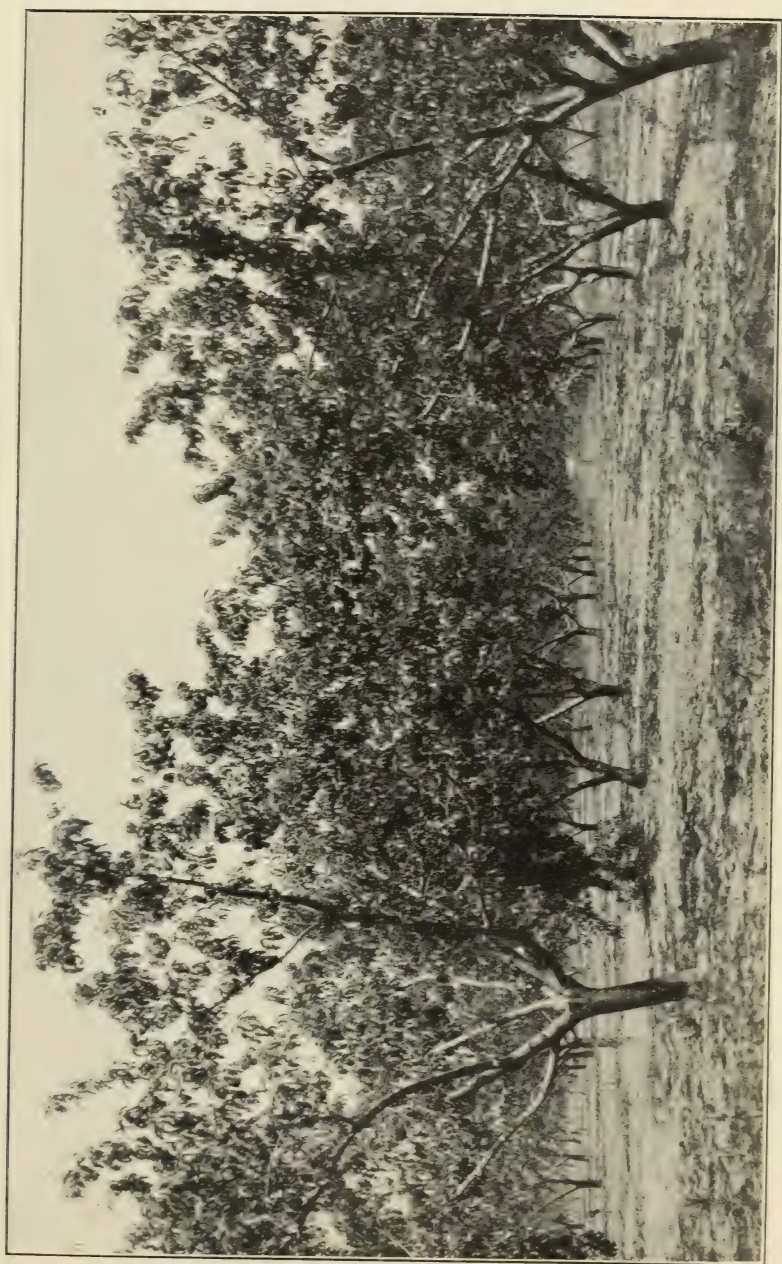
TREES OF THE COLLINS APPLE IN NORTHWESTERN ARKANSAS.



FIG. 1.—A BLOCK OF 5-YEAR-OLD TREES OF THE GANO APPLE.



FIG. 2.—A YOUNG PEACH ORCHARD INTERPLANTED WITH STRAWBERRIES.  
ORCHARDS IN THE OZARK REGION.



A PEACH ORCHARD OF THE ELBERTA VARIETY NEAR VAN BUREN, ARK.  
(Photographed July 24, 1907.)



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[Among varietal names, synonyms are distinguished by being printed in italic type.]

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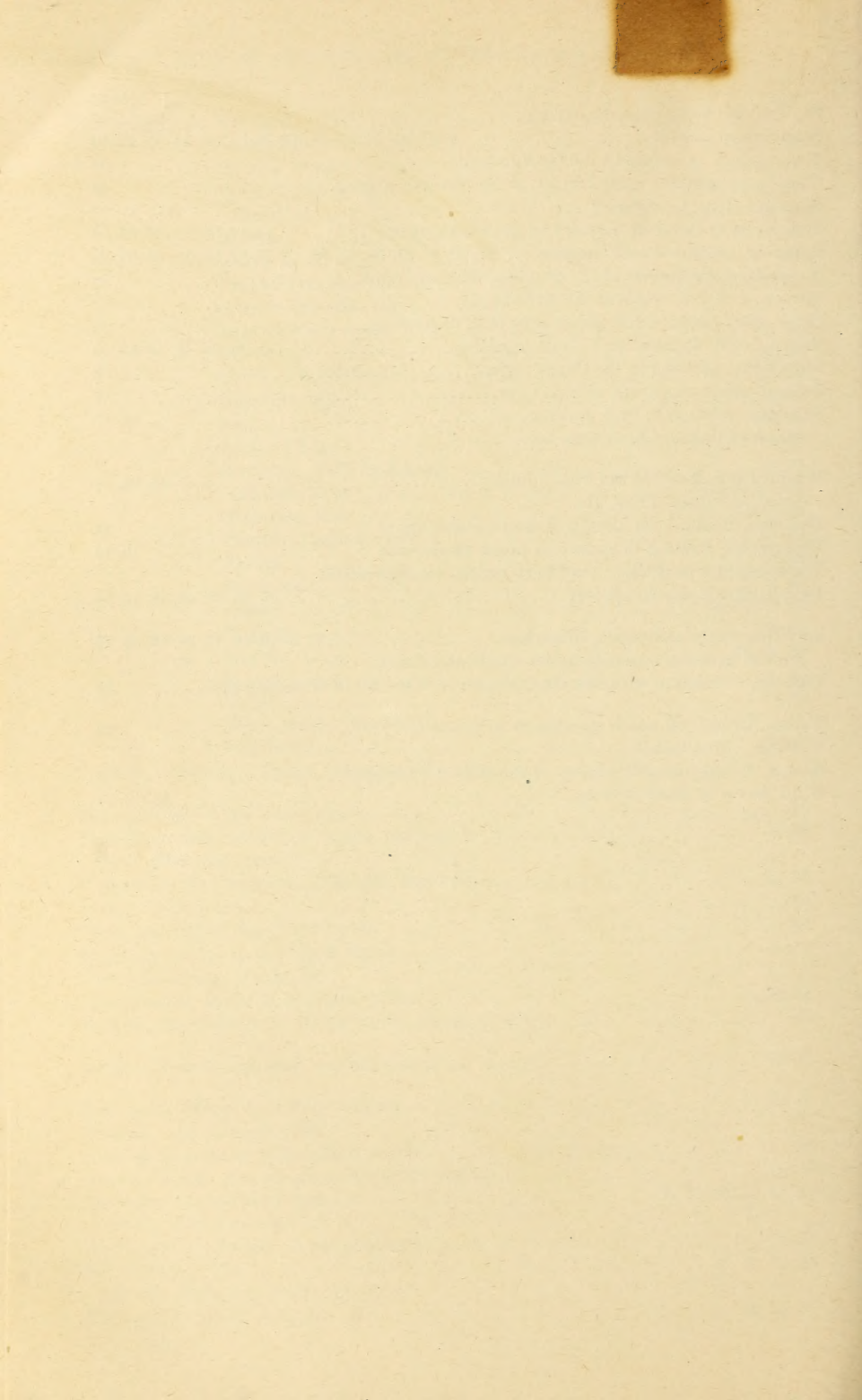
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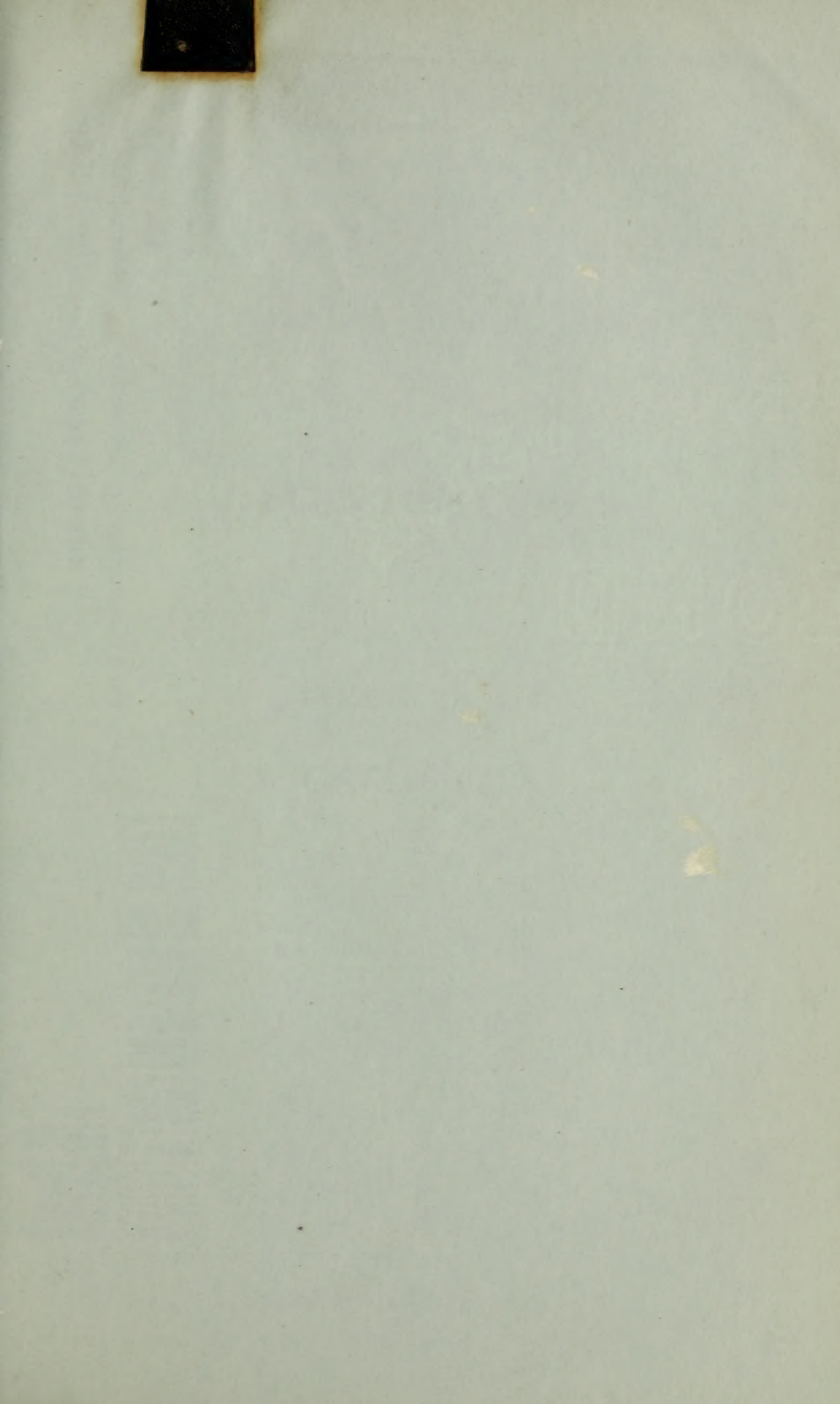
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